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The Effects of the Texas School Property Tax Abatement Program on Public School Finance

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The Effects of the Texas School Property Tax Abatement Program on Public School Finance

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Dedication

I would like to dedicate this report to my mother, father, and brother, who have lent me endless support in my educational endeavors. I am grateful for everything they have given me and for their guidance and support throughout my life.

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Abstract

The Effects of the Texas School Property Tax Abatement Program on Public School Finance

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This report explores the relationship between school property tax abatements, property wealth, and industrial firm siting in Texas. Texas adopted its school property tax abatement program, known as Chapter 313, in 2001. This report employs a mixed-methods approach to evaluate the factors that predict districts' participation in the Chapter 313 program in Texas, as well as to assess abatements' effect on industrial firm investment. The study is modeled after an evaluation of the Indiana school property tax abatement program conducted by Dalehite in 2005. Using a quasi-experimental, propensity score matching research design, I find that industrial property wealth predicts abatement program participation throughout the lifespan of the program. A district's donor status in the state's redistributive school finance system as well as its urban status predict abatement program participation early in the program's operation from 2003-2007. Lastly, I find no evidence of a relationship between abatement participation and growth in industrial property values. Findings suggest that some features of the Chapter 313 program may exacerbate inequity and confer a disproportionate share of benefits, such as payments-in-lieu of taxes and state

aid subsidies, to property-wealthy districts. Moreover, the state is currently investing billions of dollars into the program without evidence that these investments produce the intended industrial property investment in Texas communities.

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Chapter 1: Introduction

This report explores the relationship between school property tax abatements, property wealth, and industrial firm siting in Texas. Texas adopted its school property tax abatement program (also known as "Chapter 313") in 2001, in response to the state's declining rate of industrial firm attraction. Chapter 313 authorizes districts to grant tax breaks to firms that locate in their jurisdiction in exchange for property investment and job creation. Since the program's inception, lawmakers, advocates, and stakeholders have debated its efficacy – and its effects on the public school finance system, which bears full cost of the program via the state school aid formulas.

In this report, I use a mixed-methods approach to examine whether property-rich districts are more likely to grant tax abatements and whether those abatements are associated with growth in districts' industrial property tax base. Policymakers and advocates have criticized Texas' Chapter 313 program for creating a system of perverse incentives that encourages districts to enter into abatement agreements at the expense of the state school finance system. Texas allocates state funding to school districts through an aid formula based on district need and the size of its property tax base.[1] The state covers a larger percentage of per pupil costs for districts with lower revenue capacity. As a district's property tax base increases, it can expect to pay a larger share of its own costs through its local property tax revenue (Texas Taxpayers and Research Association, 2012).

[1] The Texas school finance system is multi-layered. This report focuses on the portion of funding allocated through the Foundation School Program, which is designed to equalize resources across districts based on need and revenue capacity. Additional funding is allocated through the "target revenue system," instituted in 2006. For more information, see Texas Taxpayers and Research Association, 2012.

When calculating a district's taxable property value for state school aid purposes, however, the state excludes the value of abated property, thus allowing districts to grant tax breaks to firms without experiencing any loss in state school aid. Districts, therefore, have little disincentive to offer abatements, since the state continues to pay the same percentage of per pupil costs as before the abatement. If, contrary to current policy, the value of Chapter 313 abatements was not exempted from assigned taxable value, the state school aid formulas would reflect the resultant growth in the district's property tax base and the district would receive reduced state aid. Prior to Chapter 313, the state did not exempt the value of school property tax abatements from district aid calculations.

Compounding the school aid incentives, Texas permits districts to accept side payments from firms (known as payments-in-lieu-of-taxes, or PILOTs) outside of the school property tax system entirely. These payments are negotiated voluntarily between the district and firm and are not included in the calculations for state school aid, creating yet another avenue by which districts may artificially deflate their revenue capacity in the state aid formula. Moreover, the public school finance system contains mechanisms to equalize property wealth across districts. The state recaptures revenue from property-rich (i.e. "Chapter 41") districts to redistribute to property-poor districts in what is known as the 1993 "Robin Hood Plan." PILOT payments exist outside of the property tax system entirely and as such are not subject to redistribution under Chapter 41. Districts are permitted to, in effect, trade property tax revenues (which are subject to school aid formula and redistribution requirements) for PILOT payments that are not subject to those requirements – and the districts experience no loss in state aid for participating in these agreements.

Given the material benefits that the program confers to both firms and participating districts, it is relevant to ask whether the state is disproportionately subsidizing wealthier

districts and whether, in turn, those subsidies are producing even greater levels of property wealth in those districts. In 2005, Dalehite conducted a study of the school property tax abatement program in Indiana, finding that abatements are more likely to be granted for wealthier school districts. He found, furthermore, that abatements are associated with growth in districts' personal property tax base, which he uses as a proxy for industrial property investment.

Indiana's abatement program works by exempting a diminishing portion of abated property from taxation, over the course of the abatement agreement. At the end of the abatement period, all property becomes fully taxable. The abatement program, therefore, has important implications for districts' tax base if it contributes to property value growth. Dalehite concludes that Indiana's economic development policy contradicts one of the major objective of the state's public school finance system, which is to mitigate disparities in property wealth across districts. Wealthier districts are more likely to participate in the program, and thus to experience growth in their tax base as a result of their participation.

This report provides results from a partial replication of Dalehite's 2005 study on the Indiana abatement program. I aim to elucidate: 1) the factors that influence abatement participation in Texas, and whether property wealth predicts participation; and 2) the effects of abatement participation on districts' industrial property tax base. I employ a quasi-experimental propensity score matching model to explore each of these questions and contextualize quantitative findings with data from a survey of district officials in Chapter 313 districts. From my findings, I draw inferences about the efficacy of the program and its relationship to the wealth equalization components of the school finance system.

The report begins with a review of the literature on tax abatements – their history, factors that influence participation, and their efficacy. I then discuss the history and design

of Texas' school property tax abatement program, specifically. I review Chapter 313's intersection with the school finance system and highlight recent policy debates in Texas. These introductory chapters provide foundation and framing for the research questions that I explore in Chapters 4 through 6.

Chapter 4 provides an overview of the quantitative and qualitative methodologies that I use to examine Texas' abatement program. I review my modeling strategy, regression equations, and variables, as well as my survey methodology. In Chapter 5, I discuss findings from the quantitative regression analysis. I evaluate the variables that influence districts' program participation for three separate study periods: 2003-2007, 2003-2014, and 2008-2014. I then present findings from the abatement outcome model and discuss the relationship between abatement participation and changes in industrial property investment.

Chapter 6 synthesizes the results of the regression analysis with qualitative data from a survey of school district officials and presents comprehensive findings on the program. I conclude that existing industrial property wealth predicts abatement participation, with potentially deleterious effects on equity in the public school finance system. Second, I conclude that a district's Chapter 41 status predicts participation in early years and corroborate this finding with district officials' survey responses. District officials routinely indicate that the abatement program, and in particular the allowance of PILOTs, makes the program especially attractive to Chapter 41 districts. This finding suggests that the state may wish to reevaluate its policy of allowing districts to enter into PILOTs, given their potential to confer disparate benefits to wealthier districts.

Thirdly, I find no evidence of a relationship between abatement participation and growth in the industrial property tax base, despite this being a primary motivation for district officials' decision to enter into abatement agreements. This finding suggests that

the state may be investing significant funding into a program that has no demonstrable effect on industrial investment.

Limitations imposed by the data and study design preclude making any conclusive statements about the program. However, findings from this analysis suggest that additional research is needed on the redistributive implications and economic efficacy of the program. There is currently insufficient evidence to conclude that the state's investment in the program, and the resultant fiscal losses imposed on the school finance system, are producing the desired economic effect. Moreover, the patterns in the data represent potential distributional inequities that may undermine the wealth equalization objectives of the school finance system. I recommend pursuing additional quantitative program evaluation as well as further qualitative assessment of district officials' experience with the program.

Chapter 2: Literature Review

Peer-reviewed literature on economic development incentives presents diverse findings on the factors that influence abatement participation and the effect of abatements on firm siting. A sizable body of policy literature, moreover, expresses skepticism about the purported benefits of abatement participation and is concerned with negative effects on state public finance. The academic literature often treats economic development incentives as a homogeneous body of interventions – failing to distinguish between different types of incentive programs or diversity in program design. Moreover, few authors treat school property tax abatements separately from municipal abatements, and the literature on school property tax abatements, specifically, is scarce.

In this literature review, I present an overview of the history, efficacy, and predictors of participation in tax abatement programs. I address competing perspectives on abatements from advocacy groups and local economic development practitioners. Ultimately, literature suggests that the differing interests of state and local jurisdictions, combined with common abatement design features, creates potential for such programs to benefit local jurisdictions to the detriment of the state's public finance system. Findings from this literature review will help frame and contextualize the research questions that I explore in ensuing chapters of this report.

History of Tax Abatements

States have used tax abatements throughout the twentieth century to compete for a scarce national supply of jobs and overcome regional economic disadvantages. Dalehite, Mikesell, and Zorn (2005) claim that the first documented abatement programs are found in Mississippi and Louisiana as early as 1936. Southern states enacted abatement programs in an early attempt to compete for jobs in an industrial economy and overcome the

limitations of historic underdevelopment and an unskilled workforce relative to the Northeastern and Midwestern regions of the US (Dalehite, Mikesell, and Zorn, 2005, 158).

Similarly, literature characterizes the recent proliferation of abatements as a response to the United States' shift away from a manufacturing economy in the latter half of the twentieth century (Wilson, 1993; Kenyon, Langley, and Paquin, 2012; Dalehite, Mikesell, and Zorn, 2005). The 1970s brought a wave of deindustrialization to the United States that magnified interstate competition (Wilson, 1993). The northern state economies suffered due to their heavy reliance on declining manufacturing sectors, while southern states lacked the skilled workforce necessary to compete for high-wage jobs in the new service-driven economy (Wilson, 1993).

Amidst these structural economic changes, the Illinois Manufacturing Association commissioned the first ranking of state business climates in 1975, contributing to the new era of interstate competition for industrial jobs (Wilson 1993, 99). Business climate rankings multiplied during this period. Early rankings, as Wilson explains, were heavily reliant on public policy indicators, such as tax rates, and often ignored the importance of numerous regional locational factors in firm siting. Despite these weaknesses, the new ratings placed state tax policy under heavy scrutiny from both the industrial sector and public.

The shrinking supply of manufacturing jobs, combined with a strong public focus on the policy drivers of business climate, placed pressure on states to lower their tax rates. States across the country founded Blue Ribbon Commissions to study opportunities for enhancing interstate competitiveness (Wilson, 1993). In Texas in 1981, for example, the governor formed the *Texas 2000* commission, which he tasked with producing recommendations for diversifying the state's economy in an increasingly competitive business climate (Wilson, 1993, 106).

Kenyon, Langley, and Paquin (2012) identify increasing firm mobility as another contributor to the contemporary proliferation of tax incentives. Improvements in telecommunications and transportation in the 1970s and 1980s, they suggest, reduced firms' transportation costs and increased their locational mobility. This mobility made firms "more sensitive to costs that vary by location, such as labor and taxes" (Kenyon, Langley, and Paquin, 2012, 5). Kenyon, Langley, and Paquin propose that the 41% decline in manufacturing jobs since 1978 contributed to an increase in tax abatements as states strove to remain competitive in a global marketplace (Kenyon, Langley, and Paquin, 2012, 5).

Dalehite, Mikesell, and Zorn (2005) find that the number of states with tax abatement programs grew from 15 to 35 between the years of 1964 and 2005. Tax abatement programs, therefore, represent an increasingly popular tool for states to advance their economic development goals. Interstate competition has historically driven the adoption of abatement programs at the state level and this remains true of Texas' current school tax abatement program (see Chapter 3). The expanding use of tax abatements nationally warrants examination. Literature often asks whether these programs achieve their goal of attracting industrial investment or are detrimental to state or local public finance.

FACTORS INFLUENCING ABATEMENT PARTICIPATION

Pragmatically, tax abatement programs often focus on property tax relief and are therefore administered at the local level. The role of local jurisdictions in abatement decision-making thus remains an important consideration in program evaluation. States often authorize municipalities, counties and school districts to make decisions about whether to grant abatements. Overlapping jurisdictional authority creates the potential for

contradictory program objectives at the state and local level. The state's goal is to enhance its *inter*-state competitiveness. However, because the jurisdictional authority for granting property tax abatements exists at the local level, the program may in reality drive *intra*-state competition between local jurisdictions.

Local jurisdictions are semi-autonomous entities whose own interests may not always align with the state's. Understanding the factors that influence local jurisdictions' participation in an abatement program can help illuminate areas where the program may produce unintended outcomes. The intergovernmental effects of tax policies are of particular importance for programs that rely on revenues from multiple jurisdictions, such as public k-12 education.

Dalehite (2005) performs a comprehensive literature review on the factors that influence abatement adoption at the local level. Since this report presents a partial replication of Dalehite's study in Texas, this literature review will focus on the fiscal variables that Dalehite highlights as central to his program evaluation. Understanding the factors influencing abatement adoption at the local level may help identify whether some jurisdictions bear a disproportionate share of the benefit or burden from abatement programs.

Fiscal Influencers

The following sections elaborate on the fiscal factors that inform Dalehite's 2005 program evaluation and the variables that I include in my regression model.

Fiscal Stress Hypothesis

The fiscal stress hypothesis posits that local jurisdictions offer tax abatements when they are struggling fiscally (Dalehite, 2005, 21). When jurisdictions lack sufficient revenue to pay for necessary public services, this theory states, they offer abatements in an attempt

to attract mobile capital to their jurisdiction. Jurisdictions hope that these abatements will increase the property tax base and help raise necessary revenue. Dalehite highlights a body of literature providing evidence for this hypothesis, including Bowman & Pagano (1992), Pagano & Bowman (1995), Man and Rosentraub (1998), and Wassmer (1992).

Often left out of the discussion on fiscal effects of abatement participation are the fiscal costs associated with employee migration to the region. Bartik (2004) maintains that eight in ten new jobs created through economic development incentives go to employees who would have otherwise lived elsewhere (Bartik, 2004, 8). While jurisdictions may offer economic development incentives with an eye toward improving their fiscal capacity, the reality is that firms locating in the jurisdiction will act as a population draw, and the jurisdiction will incur additional service costs associated with this migration – e.g. infrastructure needs, education costs, healthcare costs, or any other public services that the new population will access. Thus, while the tax base for the jurisdiction might expand, "the benefit and cost numbers work out so that benefits and costs are of roughly similar magnitude" (Bartik, 2004, 9).

Should the fiscal stress hypothesis hold, then communities with higher tax rates would be more likely to grant abatements, after controlling for taxable property value (Dalehite, 2005, 64). Similarly, communities that experience a decline in state or federal funding would also be expected to have higher rates of tax abatement (Dalehite, 2005, 64).

Fiscal Health Hypothesis

In contrast, some scholars posit that jurisdictions offer abatements when they are fiscally healthy. Cities with sound fiscal management, this theory articulates, are more likely to have strong public and community leadership. City officials are able to leverage the city's fiscal health to enhance its competitive edge (cited in Dalehite, 2005, 24-25).

Fiscally healthy cities, as Dalehite explains, may be more attractive to firms and may thus be in a position to offer smaller, but more frequent, abatements to attract firms.

Dalehite finds this hypothesis corroborated in Anderson & Wassmer (1995), who demonstrate that high-tax communities resist abatement pressures, and Reese (1992), who finds that growing cities are more likely to offer abatements (Dalehite, 2005, 25). This hypothesis would be evidenced in the data if communities with lower tax rates, or other indicators of fiscal health, display higher rates of abatement.

Fiscal Zoning Hypothesis

Related to the fiscal stress hypothesis, the fiscal zoning hypothesis articulates that jurisdictions offer abatements when they believe the abatements will confer fiscal benefits to the jurisdiction and are willing to make trade-offs on land use (Dalehite, 2005, 25). Local jurisdictions would require fiscal benefits to, at minimum, exceed the loss of environmental quality from siting industrial production in their community. Desire for environmental quality is income elastic, Dalehite explains, and as communities become wealthier they will be less likely to trade environmental quality for lower taxes or other fiscal benefits. Areas that are low-income, high-crime or otherwise experiencing blight associated with underutilized land may be more likely to make this trade-off. Dalehite cites Fischel (1975), White (1975), and Wassmer (1989, 1991, and 1992).

Welfare Maximizing and Additional Hypotheses

While this study, modeled on Dalehite's, focuses on the fiscal variables at play in local abatement decisions, several additional hypotheses are worth touching upon. The welfare maximizing hypothesis posits that jurisdictions want to attract firms that they anticipate will broadly improve the welfare of their residents – fiscally or otherwise

(Dalehite, 2005, 22). For example, communities may seek to attract firms that can create job opportunities while also meeting local demand for goods.

In his canonical 1990 piece on development incentives, Bartik recommends that policymakers take a "market failure" approach to economic development policy. He suggests that jurisdictions can maximize welfare by intervening only when the private market is structurally inclined to underinvest in a good that is critical to the development of the region (Bartik, 1990). A broad focus on simply jobs, he suggests, will likely result in jurisdictions overinvesting in jobs that the private market would have produced absent government intervention. This perspective is important to consider when thinking through contemporary economic development policy initiatives, as many critics ask whether state governments are spending money to attract firms that would have located in a region regardless of the incentive. If this is the case, and incentives are not required to create the jobs and investment desired by state policymakers, then the public sector is overinvesting in these goods – with resultant welfare losses throughout the system.

Bartik suggests that policymakers would better maximize welfare by directing public resources toward areas where the market fails to produce the desired results, such as with involuntary unemployment, underemployment, agglomeration economies, skilled human capital, as well as research and innovation. The market failure approach to maximizing welfare does have some limitations, namely that it does not always precisely account for non-market or social benefits, distributional effects, or the effects of one region's policy on neighboring areas (Bartik, 1990, 368). Bartik recognizes that maximizing welfare for one region may negatively affect welfare in neighboring areas. Policies can also, however, create positive spillover effects (such as with research and development) that maximizes welfare overall. Therefore, governments should pay close

attention to whether their policies are targeted toward market underinvestment and whether they are likely to produce net positive welfare effects across regions.

Also in the welfare-driven approach to economic development, Byrnes, Marvel, and Sridhar (1999) examine the generosity of local abatements. They find that abatement generosity is positively related to job creation and quality of firms' credit scores, suggesting that jurisdictions at least try to grant abatements that are good fiscal deals for local residents. This hypothesis suggests that jurisdictions exercise leverage and negotiate with firms on behalf of their residents. Local governments do not passively provide abatements out of fiscal desperation, but use them as tools to actively negotiate for enhanced welfare of their citizens. This is in contrast to the "business wins" model of abatement adoption, which hypothesizes that jurisdictions do not negotiate from a place of strength due to political pressure and information asymmetries (see citations in Byrnes, Marvel and Sridhar, 1999, 809).

Additional hypotheses are either political or economic. Some literature suggests that cities with a mayor are more likely to adopt abatements – with effects more powerful during election years (see citation in Byrnes, Marvel and Sridhar, 1999). In 2008, Dalehite, Mikesell, and Zorn concluded that abatements have such a negligible impact on tax rates that they fail to spark public opposition, and so politicians use them as a symbolic tool to garner political support.

Dalehite highlights research suggesting that some jurisdictions use abatement programs to build "agglomeration economies." Some jurisdictions believe that offering abatements to multiple sector-specific firms will create incentives for additional firms to cluster in the community. This will, they hope, produce beneficial spillover effects for the area (cited in Dalehite, 2005, 22). Bartik (1990) suggests that it is reasonable for a government to intervene in order to create an agglomeration economy. Lastly, some

literature suggests that when neighboring or overlapping jurisdictions offer abatements, this increases the long-term likelihood of abatement adoption in the primary jurisdiction. This is known as the copycat hypothesis and is explored in Anderson and Wassmer (1995) as well as Wassmer and Anderson (2001). Wilson (1999) offers a review of the literature on tax competition among independent governments, concluding that competition is typically associated with wasteful spending and welfare losses. His review of the research supports the "race to the bottom" hypothesis, positing that tax competition results in "inefficiently low taxes" and levels of public goods (Wilson 1999, 298).

This report seeks to identify the variables that are most predictive of abatement participation for school districts in Texas. I intend for findings from the quantitative portion of this report to add to the body of literature on predictors of abatement participation and inform policy discussions about Chapter 313 in Texas.

ABATEMENT EFFICACY AND INDUSTRIAL FIRM SITING

Literature provides mixed, but largely skeptical, findings as to whether tax abatements are effective instruments to induce firm siting. In their reviews of the literature on abatement efficacy, both Dalehite (2005, 29) and Kenyon, Langley, and Paquin (2012, 26) identify three means by which academics have evaluated the effect of local tax policy on firm siting: 1) firm surveys; 2) econometric regression analysis; and 3) representative or hypothetical firm models. The first two approaches are empirical, and the third is based on modeling a firm's behavior through economic theory. This report takes an empirical approach and will thus focus on findings from the empirical literature.

The primary empirical challenge in assessing the efficacy of abatements is the endogeneity of the dependent variable – that is, taxing jurisdictions may grant abatements to firms that have already decided to locate within the jurisdiction due to other factors,

thereby muddying the causal relationship between abatements and economic growth. Early attempts to clarify this causal relationship suggest that abatements do not heavily influence siting, while some recent evaluations have suggested that tax incentives may be influential under certain conditions. Studies on the influence of local tax policy on firm siting employ a variety of methodologies, evaluate a diverse array of incentive policies (not always limited to tax abatements), and differ in whether they explore inter or intraregional competition.

Firm Surveys

The firm survey approach elucidates the relationship between tax policy and siting decisions by asking firm representatives to identify factors that are, or have been, influential in their location decisions. Dalehite, for example, cites Ross' 1953 study of tax exemptions in Louisiana as early evidence of tax incentives' weak influence on firm siting. Through survey data, Ross concludes that the overwhelming majority of investments (93%) would have been made regardless of the tax break. Morse and Farmer (1986), similarly, evaluate Ohio's property tax abatement program via a firm survey and find that abatements likely influence only 25% of local investment.

However, Morse and Farmer also find that – even with this underwhelming investment percentage – the abatement program *still* exceeds cities' breakeven threshold by threefold, largely due to state aid policies that reimburse school districts for lost revenue. While numerous studies, including this report, focus on the influence of tax abatements on firm siting decisions, siting is only one component of program efficacy. Morse and Farmer's work shows that abatement program design can shift the cost-benefit outcome such that cities find the program beneficial even when the majority of investment would have occurred regardless.

Contemporary survey data continue to highlight the insignificance of taxes compared to other regional factors in firm siting decisions. In Area Development's 29th Survey of Corporate Executives, state and local tax incentives ranked only 11th on the list of locational factors important to firms. They ranked behind more influential factors such as highway proximity, occupancy and construction costs, availability of land, and availability of skilled labor, for example (Area Development, 2015).

Dalehite, in discussing the theory behind locational decision-making, cites Schmenner (1982), who posits that business siting occurs in three stages: 1) making the decision to invest, at which point taxes are irrelevant; 2) making the decision to locate in a specific state or region, at which point local tax benefits become more important but are still secondary to regional factors; and 3) making the decision to locate at a specific site, at which point regional factors are likely equivalent across local jurisdictions and taxes can thus become the marginal tipping point in a firm's decision to invest.

Econometric Analyses

In the econometric literature, Kenyon, Langley, and Paquin (2012) highlight the research of Bartik (1991) and Wasylenko (1997) as evidence that abatements do not affect interregional firm siting decisions (Kenyon, Langley, and Paquin, 2012, 26). Their meta-analysis of empirical abatement evaluations finds that differences in the tax climate *within* regions have a five to ten times greater effect on economic activity than differences in taxes *between* regions. Wilson affirms this conclusion (1993, 120), asserting that tax abatements have a greater impact on firm siting and economic development intra-regionally than they do inter-regionally. Coffin's analysis (1982) corroborates these findings, concluding that there is insufficient evidence from econometric analysis to assert that property tax incentives influence firm siting.

While there is little literature available on the efficacy of tax abatement programs in Texas, specifically, Zamudio (2004) presents an econometric analysis of municipal abatements in El Paso, Texas. He concludes that municipal abatements have not resulted in improved economic performance. His results confirm findings from previous empirical work on El Paso (Fullerton, 2002). Their findings suggest that Texas policymakers should question the assumption that abatements induce investment, especially when Texas continues to invest public dollars into local abatement agreements.

The empirical narrative, therefore, presents conditional findings as to whether abatements help to attract or retain firms. Moreover, this body of literature suggests that the jurisdictional level of analysis is important when evaluating abatement policies. Several empirical evaluations conclude that abatement decisions can influence economic development activity at the intra-regional but not the inter-regional or state level. This highlights the contradictions inherent in state-level tax abatement programs. The state's intention may be to attract firms to the state that would have otherwise gone elsewhere. However, a sizable body of empirical literature suggests that tax abatements are not likely to be a major decision-making factor when firms are selecting between state and regional locations.

Taxes *can* be an effective tool to drive siting at the local level. However, intra-regional competition is not necessarily consistent with the state's economic goals. In fact, intraregional competition may undermine the state public finance system if it causes a "race to the bottom" among jurisdictions, or if it reduces revenue for services funded from both state and local coffers, such as public education. If the previously cited copycat effect holds true, then abatements will inherently proliferate as local jurisdictions rush to compete with neighboring jurisdictions. Concern over this oft-referenced "race to the bottom" undergirds

much of the popular debate about incentives. The next section discusses the contemporary debate between policy advocates and economic development practitioners on these issues.

CONTEMPORARY POLICY DEBATES

Mixed findings from the literature support a skeptical outlook on abatements among policy analysts and advocates. Advocates have expressed concern about the proliferation of tax abatements and have criticized locally-driven (but state-funded) economic development policy. A core concern is that a disproportionate share of economic benefits is accruing to private firms from abatements, while the burden of abatements is disproportionately being borne by the public. There is special concern about how abatements affect the sustainability of programs that rely on multi-jurisdictional revenue sources, such as public education.

Private Benefit, Public Burden

Advocacy groups are concerned that abatement programs benefit private firms at the expense of the public. Good Jobs First, a national economic policy advocacy group, is outspoken in its criticism of state and local economic development incentives. The organization expresses concern that these programs have a deleterious effect on local and state public finance, conferring large benefits to corporations without sufficient accountability. Good Jobs First Executive Director Greg LeRoy's 2005 book, entitled *The Great American Jobs Scam,* makes the advocates' case for limiting the use of, and bringing more public accountability to, abatement programs. LeRoy describes marquee cases in which firms received large public subsidies in the form of tax abatements only to underperform on job creation benchmarks, go bankrupt after receiving an abatement, or otherwise fail to provide a sufficient return to the public on its investment.

LeRoy says, regarding school tax abatements, "The bottom line: when a company gets an abatement…less money goes into the local hopper for schools" (LeRoy, 2005, 116). This quote encapsulates one of the primary criticisms of abatements from the progressive advocacy community: incentives reduce revenue for public services while imposing additional costs on the public, such as the cost to educate children of new employees who have moved to the district to fill new job openings. Local and state governments, they posit, should evaluate the broader costs associated with unproven economic development policies (Bressler and Top, 2009; LeRoy, 2005; Lavine, 2013). This is especially true when abatements result in reduced revenues for programs such as public education. Whereas private firms and local jurisdictions may see abatement programs as an opportunity to incentivize local economic investment, many progressive advocates see them as reducing funding for public education and increasing the burden on the public finance system.

Pragmatic and Effective

Speaking from the economic developer and local practitioner perspective, Coan (2012) offers a rebuttal to the skepticism of academics and advocates. Why, he posits, would local communities continue to offer abatements if they were, in fact, so detrimental to the wellbeing of the community. The answer, he proposes, is that abatement programs are neither detrimental nor irrational. Coan posits that local policymakers and economic development officials must respond to both political and economic pressures. He maintains that abatement polices are efficient mechanisms to incentivize intra-regional siting decisions in a way that benefits communities.

In his article "Confessions of a Serial Tax Abater," he claims that much of the academic research fails to properly distinguish between different types of abatements and therefore paints abatements with too broad a brush. Academics are not well-attuned to the

dilemma faced by local economic development professionals or policymakers, he postulates. In the practitioner context, denying an abatement is a risky move that can mean real economic loss for a community. Local communities have good reasons for adopting abatements, he argues, and continuing to paint jurisdictions as irrational for utilizing this tool – despite its obvious popularity – is short-sighted.

Interestingly, the diverging perspectives of advocates and local practitioners on abatement programs confirm findings from the academic literature. Abatements, much of the literature finds, can and do influence firm siting *intra*-regionally. They are unlikely, however, to alter investment decisions at the inter-regional or state level. The competing perspectives expressed by state or federal-level advocates and local economic development practitioners highlight the importance of jurisdictional interests. Abatement programs that are considered popular and practical among elected officials at the local level may not serve the interests of the larger region, state, or even country. Similarly, practices that are maligned by academic scholars may serve the interests of some local jurisdictions very well. This reality may produce tension between local and state interests and create political barriers to program reform, as can be seen in Texas.

The Importance of Program Design

Many policy analysts – if not critical of abatement programs as a whole – are critical of program design that incentivizes local jurisdictions to make decisions that are costly to the state. These program design features incentivize jurisdictions to forgo revenue without internalizing the cost. Morse and Farmer (1986), in their peer-reviewed paper on the topic, find that tax abatements *are* cost-effective for jurisdictions, and that it is rational for local jurisdictions to grant them. However, this finding only holds true when the *state* absorbs the cost of the abatement by reimbursing local school districts for lost revenue.

Programmatic design forcing the jurisdiction to internalize the cost would actually render abatements cost-ineffective. Morse and Farmer conclude that hiding the true cost of abatements from local jurisdictions will lead to a heavier use of abatements, to the ultimate detriment of the state public finance system.

Given the tensions between competing jurisdictional interests, and the rapid proliferation of abatement programs despite limited evidence of efficacy, policy literature often provides program design recommendations. Kenyon, Langley, and Paquin (2012), of the Lincoln Land Institute, express skepticism about the efficacy of abatement programs. Recognizing the ubiquity of these programs, however, they offer recommendations for how state and local governments can improve program design. For state actors, they recommend: 1) targeting abatements to areas experiencing economic hardship; 2) requiring that incentives be approved by all affected jurisdictions; 3) removing perverse incentives by penalizing, rather than subsidizing, jurisdictions that offer abatements; and 4) publishing more data, and otherwise increasing transparency and accountability measures.

Dalehite, Mikesell, and Zorn (2005) review the design of abatement programs state-by-state. They conclude that abatement design is diverse and many states are not employing best practices. They find that, on average, abatement programs in the United States are too generous and contain insufficient oversight or evaluation. Many state programs offer abatements for property classes or projects that will be unlikely to yield sustainable economic benefit, and many do not contain clawback provisions or other accountability mechanisms to protect the state's investment. The authors recommend that states tighten program regulations and accountability measures to enhance program performance and protect public investment.

Cost-benefit Evaluations

Policymakers at all levels of government are beginning to adopt changes to program design in order to improve program accountability and efficacy. In particular, some cities are beginning to adopt more rigorous cost-benefit frameworks for evaluating and granting tax abatements to firms. As discussed previously, abatement programs can be evaluated on their ability to influence firm siting as well as their net cost to the community granting the abatement. There is considerable ambiguity in the literature as to whether the economic benefits of granting an abatement outweigh the costs. Many jurisdictions granting abatements fail to perform rigorous evaluations of the ultimate costs and benefits of offering a tax break to a firm. There are potential costs associated with granting an abatement in addition to the lost tax revenue. Granting an abatement to a large firm may result in population growth, an increased need for services, and rising public school enrollment – all of which place pressure on the jurisdiction's financial resources (Gamkhar and Granof, 2008).

Some jurisdictions are beginning to adopt more rigorous cost-benefit evaluation policies in order to guard against costly abatement deals. In 2008, Dr. Michael Oden of the University of Texas at Austin made a series of recommendations for the City of Austin to improve its firm-based tax incentive program. In the bevy of comprehensive recommendations contained in his report, he proposes that Austin adopt a rigorous cost-benefit analysis policy as part of its abatement evaluation process (Oden, 2008). Following the report, the city adopted this recommendation and now employs a cost-benefit matrix evaluation to each abatement application.

Transparency and GASB 77

In recent years, significant momentum has been building for additional disclosure and transparency requirements in tax abatement programs. In 2013, Good Jobs First praised

Austin, Texas, for its abatement transparency (McIlvain, Mattera, and LeRoy, 2013). The city scored full points in the Good Jobs First abatement disclosure and transparency evaluation (McIlvain, Mattera, and LeRoy, 2013).

In a major step towards increased transparency, the Governmental Accounting Standards Board (GASB) issued Statement No. 77 in August, 2015. This statement newly requires all jurisdictions to disclose the tax abatements that they grant, or that have been granted by another jurisdiction but which will affect the reporting entity's revenues. Governments are required to comply with this new accounting standard for periods and statements following December 15, 2015.

In a report preceding the issue of the statement, GASB Board Member Dr. Michael Granof and Dr. Shama Gamkhar at the University of Texas at Austin made the case for treating tax abatements as a type of local tax expenditure. Abatements should be fully disclosed, they state, in order to: 1) ensure the public's access to clear information about the financial position of governmental entities; 2) effectively evaluate and monitor the contractual abatement arrangements between the governmental entity and the firm; and 3) effectively perform cost-benefit analyses of the program.

It remains to be seen what effect the national GASB rule will have on the proliferation of abatements locally, and whether local jurisdictions will be less inclined to grant large abatements if they must disclose them as expenditures. In 2015, the Urban Institute published a paper highlighting potential issues with compliance, including lack of internal auditing capacity by local governments. The paper anticipates that the rule will provide the public with access to valuable additional information about abatements in local communities (Francis, 2015).

Policy debates regarding school property tax abatements in Texas are similar to those happening on the national stage, or in other states. Discussions over jurisdictional

authority, transparency, and the relative cost-benefit of the Texas abatement program occur during each legislative session in which the program comes up for reauthorization. The research findings in this report will hopefully contribute to the body of evidence-based policy knowledge on the efficacy of abatement programs.

SCHOOL PROPERTY TAX ABATEMENTS

Property tax abatement programs can affect the portion of local taxes that goes toward municipalities, counties, or school districts – or all of the above. A *school* property tax abatement applies to that portion of local property taxes that funds the local public school district. Since school taxes comprise such a large percentage of property taxes – 55 percent in Texas in 2013 (Texas Comptroller of Public Accounts, 2014) – school property tax abatements can significantly reduce a firm's tax burden. While literature on economic development incentives and tax abatement programs is expansive, literature on *school* property tax abatements is scarce. Some academic literature discusses the intersection of school finance and tax abatement programs (Morse and Farmer, 1986), but this material is the exception rather than rule.

In 2003, the National Education Association (NEA) commissioned Good Jobs First to produce a report examining school property tax abatement programs state-to-state and exploring their implications for public school finance. The report found that, in 2003, 25 states allowed jurisdictions to abate school property taxes. Only 5 states prohibited local jurisdictions from abating school property taxes (National Education Association, 2003, 13). The report, importantly, found that very few states granted school districts the autonomy to approve an abatement. In 2003, only five states gave school boards formal authority to approve or reject a proposed abatement – among them, Texas. Texas and

Pennsylvania were unique in granting school boards *full* authority over school property tax abatements.

Thus, in many states, school property tax abatement programs exclude school boards from the decision-making process entirely, allowing cities and counties to abate school property taxes without input from the district whose revenues will be affected. This policy can cause discord between local government and school district officials, especially when the abating city or county negotiates supplemental payments from the firm that they are not required to share with the school district. Advocates have raised this issue in Jersey City, for example, where the city grants large tax abatements to fund commercial developments, reducing revenues for the local school district. The city then accepts supplemental payments from firms that it does not share with the schools (Bressler and Top, 2009). Advocates complain that school districts, which do not have a say in abatement policy, lose revenue from these deals and do not reap the benefits (Bressler and Top, 2009). The NEA report found that at least a third of states did not reimburse schools for lost revenue from property tax abatements.

The NEA report also contains a detailed description of the Texas school property tax abatement program. At the time of the report's publication, the Chapter 313 program was new. The report reviews key features of Texas' program, highlighting the autonomy that school districts have under the Chapter 313 program to approve abatements. It also reviews changes to Texas' abatement reimbursement policies over time. The report, while concluding that states should prohibit the abatement of school property tax revenues altogether, recommends at least improving disclosure standards and giving school boards authority to approve abatements.

In the literature, Dalehite's 2005 evaluation of the Indiana program is one of the few studies that treats school property tax abatements separately from municipal or county

abatements and discusses the program's implications for equity in the Indiana school finance system. This report offers a partial replication of Dalehite's 2005 evaluation of the Indiana school property tax abatement program. Dalehite conducts an econometric regression analysis on the Indiana program from 1984-2000. Indiana has a redistributive school finance system that attempts to equalize property wealth across districts through school funding formulas. Dalehite's research asks whether property-rich schools are more likely to participate in the abatement program, and whether the program is effective in expanding participating districts' industrial property tax base.

Dalehite finds that granting an abatement has a positive effect on the industrial property base. His analysis also shows that property-rich schools are more likely to participate in the program. From these findings, he concludes that the effects of Indiana's economic development policy run counter to the objectives of the school finance system. I discuss Dalehite's methodologies at further length in Chapter 4 of this report.

Indiana's abatement program exacerbates, rather than ameliorates, disparities in property wealth between districts. Policymakers and advocates regularly debate the effects of Texas' school property tax abatement program on the public school finance system and whether the program is effective at inducing industrial firm siting. Chapter 3 discusses policy debates on the Texas abatement program. Given similarities between the Texas and Indiana school finance system and abatement programs, I undertake a replication of Dalehite's study in Texas. This report seeks to add to the body of literature on tax abatements, broadly, as well as school property tax abatements specifically.

Chapter 3: The Texas Tax Abatement Program

This chapter discusses the origins and characteristics of the Texas school property tax abatement program, as well as its intersection with the state's public school finance system. It presents descriptive data on the program in order to provide a foundational context for the chapters that ensue. Understanding the objectives and trajectory of the program will help frame the research questions explored in the remainder of this report and offer important context for the discussion in the final chapter.

Tax abatements are under debate not only in academic and national circles, but in the state of Texas. An often heated discussion regarding the efficacy of the school property tax abatement program is ongoing in Texas. The program has repeatedly received critical media coverage, and its iterative renewal in successive legislative sessions has not been without controversy or protest from lawmakers and advocates. This chapter presents an overview of the historical and political context of the program, which informs the research agenda in this report.

ORIGINS

As with many tax abatement programs that states adopted during the latter half of the 20th century, the Texas Legislature adopted its school property tax abatement program with the objective of attracting industrial manufacturing firms to the state. The Legislature adopted the program, known alternatively as either the "Texas Economic Development Act" or "Chapter 313" for its codification in the state's Tax Code, in 2001. The program took effect in 2002 (HB 1200, 2001).

The pressure to compete economically with other states was a strong driver of adoption. In March of 2001, Texas economist Ray Perryman wrote an editorial for the *Amarillo Globe-News* warning that Texas lagged behind other states in attracting

manufacturing firms (Perryman, 2001). Perryman expressed concern that Texas' property tax-heavy revenue system placed a high tax burden on capital-intensive manufacturing industries. Moreover, he explained, during the mid-1990s, other states began to offer abatement programs and economic incentives that further exacerbated the relative cost of locating in Texas. Citing additional structural economic factors, such as the increasing mobility of labor and capital, Perryman called Texas' 2001 position "untenable" and endorsed the Texas Economic Development Act.

While the pressure to create a low-tax climate for industrial firms is not unique to Texas, it has arguably been intensified by the state's lack of an income tax (Copelin, 2012). Lacking the third pillar of most contemporary state revenue systems (i.e. property, sales, and income tax), the burden of financing local municipal services, as well as public education, falls heavily on property-owners and capital-intensive businesses. The corporate tax burden in Texas, however, remains relatively low overall, due to the lack of corporate and individual income taxes as well as many opportunities to claim depreciation and low tax rates for inventory. In 2015, Texas ranked 10th nationally in the Tax Foundation's State Business Climate Index, which is based on a number of taxes including corporate and personal income, sales, unemployment insurance, and property taxes (Walczak, Drenkard, and Henchman, 2015).

Texas originally authorized cities and counties to offer property tax abatements in 1981 with the Property Redevelopment and Tax Abatement Act, now codified in Chapter 312 of the Texas Tax Code (SB 17, 1981). The original statute permitted cities and counties to abate the school district's portion of property tax levies. In 1987, the Legislature amended Chapter 312 to grant school districts the authority to approve or reject proposed abatement agreements that would affect district revenues (Property Redevelopment and Tax Abatement Act, 1987).

Originally, the state exempted the value of abated property from districts' total property tax base for the purposes of calculating state school aid, thereby ensuring that districts would continue to receive the same amount of funding from the state even if firms made property investments in the district as part of an abatement agreement. While the state school finance system is complex and multi-tiered, Texas allocates a portion of its funding to school districts through an aid formula based on district need and the size of its property tax base.[2] The state covers a larger percentage of per pupil costs for districts with lower revenue capacity. As a district's property tax base increases, it can expect to pay a larger share of its own costs through its local property tax revenue (Texas Taxpayers and Research Association, 2012). Prior to 1993, the state exempted the value of abated property from districts' property tax valuation for state school aid purposes, thereby ensuring that the district would not suffer any loss in state aid from a local decision to grant a tax break to a firm.

In 1993, the Legislature made important changes to the Texas Education Code (SB 7, 1993). At this point, the state chose to incorporate the value of abated property into the district's property tax base for the purposes of calculating the amount of state aid that the district would receive. In other words, if a school district entered into an abatement agreement committing to exempt $1 billion in qualified property from taxation in the next year, that $1 billion increase in property value (though untaxed) would still be included in the state calculation of the district's property tax base, thus resulting in reduced state aid to that district. Prior to 1993, the state had indirectly subsidized districts' participation in the abatement program through the state aid system, and this policy change forced local school

[2] The Texas school finance system is multi-layered. This report focuses on the portion of funding allocated through the Foundation School Program, which is designed to equalize resources across districts based on need and revenue capacity. Additional funding is allocated through the "target revenue system," instituted in 2006. For more information, see Texas Taxpayers and Research Association, 2012.

districts to internalize the cost of granting those abatements (Texas Education Code, Sec. 36.008, 1993).

According to the National Education Association and Good Jobs First, this change resulted in a dramatic decline in the number of school districts participating in new abatements, from 55% to 8% statewide (National Education Association, 2003). One 1996 news article reports tension between Texas cities – whose sales taxes were buoyed by increased consumption and economic activity resulting from firm attraction – and school districts, for whom abatement participation became costly following the 1993 policy change (Robbins, 1996). District officials, the Lubbock-based paper reports, felt pressure from city officials to approve abatements that would impose large losses in both revenue *and* state aid on their districts. Some school district administrators called for a ban on school property tax abatements altogether during this time period, largely due to the fiscal costs associated with participation.

In 2001, however, under pressure to enhance Texas' competitiveness, the Legislature adopted the Texas Economic Development Act (HB 1200, 2001), which gave schools full autonomy to grant abatements under a new, separate program (Chapter 313). Moreover, the legislation *reinstated* the indirect subsidy to participating districts by once again exempting the value of abated property from districts' property tax base (HB 1200, 2001). The value of property that is abated under any Chapter 313 agreement is subtracted from the district's total taxable value in the Comptroller's annual Property Value Study, which is used as the basis for state aid calculations (Texas Government Code Sec. 403.302). Therefore, the value of abated property is invisible in the state aid formula, and districts are not at risk of having their state aid reduced when firms locate in their district under a Chapter 313 agreement. Although this paper does not evaluate Tax Increment Financing in Texas, it is notable that property located within Tax Increment Financing Zones is also

exempted from districts' property tax base for the purposes of state school aid calculations (Texas Government Code Sec. 403.302).

In 2001, Texas barred school districts from participating in abatement deals under the existing Chapter 312 program, thereby creating a separation between the school district abatement program and the program for cities and counties. Today, Chapter 312 governs the abatement program for cities and counties while Chapter 313 governs the school property tax abatement program. The narrative introduction to HB 1200, Chapter 313's authorizing bill, confirms the act's emphasis on interstate competition and the manufacturing sector, finding that:

> *(1) many states have enacted aggressive economic development laws designed to attract large employers, create jobs, and strengthen their economies;*
>
> *(2) the State of Texas has slipped in its national ranking each year between 1993 and 2000 in terms of attracting major new manufacturing facilities to this state;*
>
> *(3) a significant portion of the Texas economy continues to be based in the manufacturing industry, and the continued growth and overall health of the manufacturing sector serves the Texas economy well;*
>
> *(4) without a vibrant, strong manufacturing sector, other sectors of the economy, especially the state's service sector, will also suffer adverse consequences; and*
>
> *(5) the current property tax system of this state does not favor capital-intensive businesses such as manufacturers.*

The Legislature originally authorized the program to operate for five years, through the end of 2007. However, the Legislature reauthorized it successively in 2007, 2009, and 2013, and approved expansions to the program during the most recent 2015 legislative session.

PROGRAM DESIGN

Chapter 313 gives school districts the authority to limit the appraised value of a firm's property in exchange for a minimum property investment and commitment to job creation (Texas Tax Code, Chapter 313, 2016). The program's stated objective is to incentivize industrial firm siting. As such, limitations on appraised value (i.e. abatements) are available only to specific industries. The law also creates a wage threshold for jobs that is pegged to wages in the local manufacturing sector. The minimum firm investment required to receive an abatement varies based on the total taxable value of the school district in question.

Texas' Chapter 313 program has a number of laudable features, and several that are unique to Texas. Among school tax abatement programs, specifically, Texas has historically been one of only two states that grants full local authority to the school district for abatement approval, as opposed to allowing cities or counties to make those decisions without input from the district (National Education Association, 2003). As of 2009, Texas districts share this authority with the Texas Comptroller of Public Accounts, but cities and counties do not have authority to abate school district revenues. As discussed in the literature review, in many states the school board lacks authority to approve or reject abatement agreements. In these states, abatement programs can cause fiscal stress for districts when cities abate district revenues without sharing accompanying fiscal benefits, such as payments-in-lieu of taxes (Bressler and Topp, 2009).

Dalehite, Zorn, and Mikesell (2005) propose a framework for cataloguing variation in abatement programs from state-to-state (whether at the city, county or school district level). Table 1 draws heavily from their framework to provide an updated and expanded catalogue of program features for Texas' Chapter 313 program, as of 2016.

Feature	Texas Chapter 313
Abatement Model	Limitation on appraised value of qualified property Applies to Maintenance & Operations tax burden Firms pay taxes on the full market value of non-abated property
Abatement Value	Minimum value limitations (district can offer more): - Standard: $20-$10 million, based on district's taxable property value - Special Investment or rural area: $10–$30 million, based on industrial value
Special Conditions for Award	Job creation - 25 new qualifying jobs (10 for Strategic Investment or rural area) - Qualifying jobs have health benefits and wages set to 110% of county manufacturing wage - Can waive job requirement if district says exceeds industry standard Minimum qualified property investment (districts can require more): - Standard: $20-$100 million, based on district taxable property value - Strategic or rural area: $1 - $30 million based on taxable industrial value Required to remain in district for 5 years following expiration of the limitation
Reimbursement or Subsidy	Yes. The value of abated property is subtracted from the district's property tax base in the annual Property Value Study, which the Comptroller uses to determine the amount of state aid that the district will receive. Districts experience no reduction in state aid from ensuing property investment under Chapter 313 agreement, amounting to an indirect subsidy.
Supplemental Payments	Permitted only when do not exceed greater of: - $100 per student per year - $50,000 per year - *And* cannot extend beyond three years of limitation expiration
Eligible Projects	Semiconductor, nuclear power, integrated gasification combined cycle electrical, advanced clean energy, computer services, R&D, manufacturing, and Texas priority projects of over $1 billion
Process for Granting Award	Local discretionary plus state approval Texas Comptroller issues "certificate for a limitation of appraised value" based on: - Nonbinding economic impact evaluation - Projection that additional revenue will offset full abatement cost over 25 years - Limitation being determining factor in the firm's decision to invest Texas Education Agency issues statement to district on fiscal impact
Special Target Area	Texas Reinvestment or Enterprise Zone (Chapter 311) Strategic Investment and rural areas: have lower special conditions requirements and minimum appraisal limitation values. Strategic Investment Areas: have high unemployment rates or are designated federal urban enterprise communities or defense economic readjustment zones.
Abated property	Real and personal
Time Period	Ten years, excluding 2-year initial qualifying period wherein firm pays taxes
Accountability Provisions	Clawback if special conditions not met Sunset: Expiration date defined in statute, currently expires in 2022 Audit: The state auditor performs an annual spot-check on three active abatements

Table 1: Features of the Texas Chapter 313 School Property Tax Abatement Program
Source: Framework derived from Dalehite, Mikesell, and Zorn (2005), updated and expanded to reflect the most current Chapter 313 of the Texas Tax Code

One positive feature of Texas' abatement program, according to standards established in the literature, is its sunset provision. A sunset provision, as Dalehite, Mikesell, and Zorn (2005, 169) articulate, can bring accountability to a program by requiring the Legislature to regularly reevaluate whether it is still necessary to achieve the state's economic development goals. However, while Texas' program technically contains a sunset provision, the Legislature continues to reauthorize the program. Thus, the sunset provision may not function as intended if the program's reauthorization is assumed. Moreover, the Legislature has reauthorized the program for increasing durations, most recently reauthorizing the program's operation for another ten years from 2013-2022. The Legislature has renewed and even expanded the program each time it faces expiration, despite protests from both conservative and progressive lawmakers and subpar program evaluations from the Comptroller and Legislative Budget Board (Legislative Budget Board, 2011; Texas Comptroller of Public Accounts, 2011).

Another positive feature of the program is its requirement for a minimum property investment and number of jobs. These "special conditions," as Dalehite, Mikesell, and Zorn categorize them, can help ensure a net benefit to the taxing jurisdiction and the state, as well as target the program toward larger firms that are more likely to have competitive location alternatives. However, as is becoming increasingly apparent in Texas, the jobs creation component of the program is lagging behind the property investment component. The Legislative Budget Board reported that between 2007 and 2011, sixty-three percent of projects were accompanied by a waiver of the jobs requirement (Legislative Budget Board, 2011). Therefore, while Texas technically has special conditions requirements on the books, in practice these requirements are not binding.

Texas has a discretionary abatement approval process, as opposed to as-of-right, which means that jurisdictions can exercise choice as to whether they want to grant an

abatement – no firm is entitled to receive an abatement simply from meeting threshold criteria. The program focuses on manufacturing incentives, as opposed to commercial, which can help ensure a net benefit to the state and local taxing entities. The Texas Comptroller has also praised recent changes, such as the addition of reporting and transparency measures and increased oversight authority for the Comptroller's office (Texas Comptroller of Public Accounts, 2011).

However, the program also has a number of features that, according to standards in Dalehite, Mikesell, and Zorn (2005) may undermine its efficacy. These include limited state oversight, allowing limitations on the appraised value of land, and a lengthy uniform award duration of ten years. The Comptroller has expressed concern about the invisibility of program expenditures in the state budget, the lack of a cap on abatement expenditures, the limited amount of state oversight, and the waiver of job requirements by the majority of projects in recent years (Texas Comptroller of Public Accounts, 2011).

In one of its most important program features, the state protects school districts from loss in state aid that would otherwise result from a firm investing property in the district. The value of abated property is exempted from the assigned taxable property value that is used to calculate both state aid and revenue redistribution obligations, therefore shielding districts from the loss of state aid they would typically incur from a growing property tax base (since school aid is strongly tied to a district's property tax base). This policy creates a disincentive for districts to exercise discretion when granting abatements. Districts are not forced to forgo state aid when firms invest property in the district, and wealthy districts can use Chapter 313 as a way to shelter local revenue from redistribution requirements (Robbins, 2009; Imazeki and Reschovsky, 2003, 28). As Morse and Farmer find in their study (1986), reimbursement from the state makes granting abatements economically advantageous for districts where it would otherwise be cost-ineffective.

Morse and Farmer suggest that reimbursement policies create a perverse incentive for districts to adopt abatements that are not economically efficient, and recommend that program design force local jurisdictions to internalize abatement costs (Morse and Farmer, 1986).

Districts are also permitted to receive payments-in-lieu-of-taxes (PILOTs) from firms outside of the school property tax system. These side payments can be large and in some cases provide serious additional funding to the district. Some districts have even established small foundation programs that they fund with PILOT payments from multiple abatement deals over time (Smith, 2011). Firms enter into PILOT agreements voluntarily, and these payments are negotiated independently between districts and firms as part of the abatement deal. Some critics of Chapter 313 have pointed to the existence of PILOTs as evidence that firms (and not the public) are the primary beneficiaries of the tax abatement program, since firms are apparently willing to *pay* large sums of money to districts in order to receive the abatement. The value of the abatement, it is argued, must exceed the amount that the firm would be willing to accept, since firms would presumably not otherwise pay districts on the side to receive the tax breaks. This suggests that firms would still choose to participate in the abatement program for a much smaller tax benefit and that the state is paying too much to attract these firms. PILOT payments can strongly incentivize *districts* to participate in the abatement bargaining process, since PILOTS exist outside the property tax system and are not subject to school aid or redistribution requirements.

The state's policy on exempting abated property from school aid calculations, combined with PILOT allowances, provides a strong incentive for districts to participate in the abatement program. Districts bear little to no financial burden when adopting an agreement, as the state makes them whole with regard to state school aid. Moreover, districts can negotiate additional PILOTs from the firms that are not subject to

redistribution. Chapter 313 also allows districts to include a financial support clause in their abatement agreements obligating the firm to pay additional funds to the district should the district incur unforeseen costs not reimbursed through state aid, such as for portable classrooms or additional personnel. Firms enter into these additional obligations voluntarily as part of the abatement negotiation process with individual districts. Read on for more detailed information about the program's intersection with school finance.

Since the program's adoption in 2001, the Legislature has enacted numerous changes to its design. See Table 2 for a timeline of program changes. Several pivotal changes have affected the program's operation. In 2005, the Legislature introduced the first non-manufacturing industries to the list of eligible projects. These additions paved the way for the influx of wind power and clean energy firms in later years. Second, in 2007, the Legislature allowed districts to waive jobs requirements for firms. This also allowed for the influx of property-intensive, but low-employment, wind farms, which now dominate the abatement pool.

In 2009, the Legislature made significant changes to the program. It gave greater oversight powers to the Comptroller's office, limiting state aid reimbursement only to projects that the Comptroller granted approval for. It also increased transparency requirements and placed limitations on PILOTs. In 2013, the Legislature made the Comptroller's disapproval binding and loosened wage requirements for firms. According to Chapter 313 in the Texas Tax Code, when approving an abatement agreement, the Comptroller must determine that:

1. The firm and proposed abatement agreement meet basic eligibility requirements pertaining to industry, qualified property investment, and other requirements.

2. The agreement will be "reasonably likely" to generate sufficient additional tax revenue by the 25th anniversary of the agreement to off-set the loss of revenue to the district as a result of the abatement.
3. The limitation on appraised value is the determining factor in whether the firm will locate in Texas.

Texas lawmakers have criticized the program's design in recent years. Former Republican State Senator Steven Ogden, for example, unsuccessfully attempted to limit state reimbursement to abating schools while he was Chair of the Senate Finance Committee (Copelin, 2012). He also sought to give the Comptroller more discretion about which agreements to approve (Copelin, 2012). Conservative groups such as the Texas Conservative Coalition and Research Institute (2013) have expressed concern that the program's design impedes its original job creation objectives. A large percentage of tax benefits now goes to the wind farm sector, which creates fewer jobs than the manufacturing sector.

Some critics, such as Dick Lavine of the progressive Center for Public Policy Priorities, express concern that many firms would have located in Texas regardless of whether they received a tax benefit. The state, Lavine worries, is paying firms that would have come to Texas without the incentive. He highlights, for example, a gas plant in the Kenedy school district whose stated function was to produce gas in the Eagle Ford Shale. The very function of the business, Lavine pointed out, is region-specific, suggesting that the firm probably did not require a state incentive to locate in the region (Hart, 2013).

YEAR	BILL	PROGRAM CHANGE
2001	HB 1200	Establishes Chapter 313, authorizes program through 2007
2002	-	Chapter 313 takes effect
2003	-	First Chapter 313 agreements take effect
2005	HB 2201	Expands list of eligible industries to include clean coal and gasification projects
2006	HB 3	Reauthorizes program through 2011 Places oversight authority with Texas Education Agency (TEA) Directs TEA to conduct binding economic impact analysis for abatement applications Adds wage requirements for rural areas
2007	HB 1470	Reauthorizes program through 2011 Grants districts option to waive job requirements Returns primary administrative oversight from TEA to the Comptroller Requires the Comptroller conduct a nonbinding economic impact analysis
2007	HB 2294	Expands eligible industries to include nuclear power and integrated gasification
	HB 3732	Replaces clean coal and gasification language with "ultra-clean energy projects"
2009	HB 3676	Reauthorizes program through 2014 Enacts lower wage requirement for firms with $\geq$ 1,000 employees Requires district to hold public hearing to approve agreements if Comptroller issues disapproval Includes abated property in assigned taxable value for state aid, if the Comptroller issues disapproval Requires additional reporting and transparency for firms and the Comptroller Permits additional payments to offset increased costs to the district Limits PILOTs from firms to districts to $100 per student annually Adds clawback provision
2013	HB 3390	Reauthorizes program through 2022 Requires districts and firm obtain "certificate of limitation" from Comptroller Makes disapproval from Comptroller binding (removes public hearing requirement) Requires the 25 required jobs to meet "qualifying job" standards Requires the 10 required jobs, for rural areas, to meet "qualifying job" standards Removes requirement that "80% of *all* new jobs" meet qualifying job standards Removes wage level exemption for firms $\geq$1,000 employees Expands the list of eligible projects to include "Texas Priority Projects" Requires state auditor to conduct annual spot check of abatement agreements Allows firm to double count jobs from a single project in two districts Changes criteria that Comptroller must consider when granting certificate of limitation Extends abatement duration from 8 to 10 years Adds financial penalty for failure to meet job requirements Adds reporting and transparency requirements for Comptroller and firms Adds Strategic Investment Area Raises minimum limitation amounts for rural and strategic area investments Raises PILOT cap to the greater of either $100 per student or $50,000 annually Repeals tax credits to firms for taxes paid during qualifying period
2015	HB 2826	Expands Chapter 313 to include unified projects that overlap with up to three districts

Table 2: Timeline of Chapter 313 Program Reforms

Source: Author's bill and statute analysis, news media coverage; as well as Lavine (2007, 2013, 2015), Casey and O'Hanlon (2008), and Casey, Popinksi, and O'Hanlon (2009).

Recent reports from the Comptroller, Legislative Budget Board, and State Auditor's Office offer the following critiques of the program:

1) No requirement exists for schools or the Comptroller to verify jobs created independently (Texas State Auditor's Office, 2014 and 2015)
2) There is no cap on expenditures; state tax expenditures through the program are potentially limitless and unaccounted for in the budget (Legislative Budget Board, 2011; Texas Comptroller of Public Accounts, 2011)
3) The economic impact evaluation that the Comptroller performs is only a presentation of information, and not a true evaluation of the impact of the project on the state or local economy (Legislative Budget Board, 2011)
4) The cost is borne entirely by state, but the state has little oversight. Districts have little disincentive to reject abatement agreements (Legislative Budget Board, 2011; Texas Comptroller of Public Accounts, 2011)
5) Companies have a disincentive to create jobs above a statutory minimum and many jobs requirements are waived (Legislative Budget Board, 2011)
6) Wind energy does not create as many jobs, but increasingly constitutes a large portion of abated property value (Legislative Budget Board, 2011; Texas Comptroller of Public Accounts, 2011)

In an evaluation of the program in its 2011 Government Effectiveness and Efficiency Report (GEER), the Legislative Budget Board highlights the complexity of assigning economic development authority to overlapping governmental jurisdictions and questions whether economic development should rest under the purview of schools:

> *…school districts should not be made responsible for economic development. School districts have the primary responsibility for implementing the state's system of public education and ensuring*

> *student performance…A lack of balance in the roles, responsibilities, and authority of the state and of local school districts within the program limits its effectiveness."*

POLITICAL CLIMATE

Preserving and enhancing Texas' economic competitiveness remains a core driver of program support. As recently as January, 2016, the *Bay Area Houston Magazine* opined in an editorial: "Without 313 agreements, our region would be less enticing to big businesses and we could lose important projects to Louisiana and other states." The article brags that La Porte ISD (LPISD), located in Harris County, currently hosts eight Chapter 313 agreements, which purportedly enhance its economic competitiveness.

Whereas, during the nineties, the state's school aid reimbursement policy made the tax abatement program unpopular among many school districts, today the program maintains a high degree of popularity among district administrators. Consulting groups and lobbying groups represent districts' interests at the Legislature and seek to preserve the program for the benefit of participating districts (Casey and O'Hanlon, 2008; Casey, Popinkski, and O'Hanlon, 2009). Some district administrators see the program as an opportunity to attract businesses that will grow their district's tax base in the long-term, thereby enhancing the district's fiscal health. District administrators feel they can grow their tax base in the long term without sacrificing state school aid in the short-term (since the value of abated property is exempted from the property tax base for school aid calculations). The *Bay Area Houston Magazine* article quotes La Porte ISD's superintendent: "These industries probably would not have located in La Porte had it not been for the ability of our school district to enter into Chapter 313 agreements with them."

Districts also enjoy supplemental PILOT payments from firms outside of the school property tax system. Neither PILOT payments nor the value of abated property is included when determining whether and how much a district owes in redistributive school finance

funds. Property-wealthy “Chapter 41” schools typically owe some amount of excess revenue to the state, but by granting tax abatements they can reduce their assigned property tax base and, by implication, the amount they owe in recaptured revenue to the state. Districts can then make up some of the reduced tax revenue from the abatement with supplemental PILOT payments.

While the literature shows that there are fiscal costs associated with abatements in the form of increased service needs and employee in-migration, I was unable to locate any quotes from administrators expressing concern about these potential costs. Perhaps part of this is due to the state’s policy on state school aid. Districts receive the same amount of funding from the state as if they had not granted an abatement – growth in abated property is exempted from the base that is used to calculate a district’s state aid. If the district’s population grows, but its assigned property tax base remains static, then the state foots the bill for any resultant growth in need.

Firms also continue to lend strong support to the program. Samsung currently benefits from an active abatement agreement with the Manor Independent School District (MISD). In 2012, leading up to the program’s 2013 reauthorization, Samsung’s spokesperson in Austin emphasized the importance of renewing the program. "I can't emphasize enough how critical 313 is to us," Morse said, "To get that (future) investment, we have to have 313 reauthorized” (Copelin, 2012).

The program has received controversial media coverage in prior years. The *Austin-American Statesman*, the *New York Times*, the *Texas Observer* and the *Houston Chronicle* have all published pieces that highlight the program’s perverse incentives. In 2011, the *New York Times* published an article entitled “Wind Money Fuels Spending and Benefits in Small Schools.” The article highlights Blackwell ISD, which received a $35 million PILOT from a wind farm deal that the district brokered in 2005 as part of the 313 program.

This money has paid for a football stadium, an academic complex, and a scholarship foundation (Smith, 2011). School district administrators see the program as a source of funding for everything from infrastructure to early college preparation. In 2012, the *San Antonio Express-News* published an article entitled, "Texas' tax abatement program too broad," followed in 2013 by the Austin American Statesman's, "Big Money, Little Oversight."

Stakeholders in the program are diverse and run the gamut from school district superintendents to oil and gas firms, manufacturing firms, and increasingly the wind energy sector. Every legislative session, the wind energy sector monitors developments in Chapter 313. In fact, some stakeholders have indicated that the wind sector has come to expect tax abatements from local districts. In a 2013 article for *North American Windpower*, two sector consultants opined that, prior to 2013 program changes, "Chapter 313 [was] considered a 'right' for any wind farm planning to do business in Texas," but that more stringent regulations would change this expectation (Molina, 2013).

Conservative think tanks and Republican legislators have expressed concern about the program and its effects on the school finance system. Republican State Senator Lois Kolkhorst said in 2013, regarding Chapter 313 PILOTS, "We spend a lot of time talking about equity in this building and then we have off-book finances that create inequity" (Hart, 2013). Conservative advocacy groups have critiqued the program, calling it corporate welfare. The Texas Public Policy Foundation (TPPF) recommends the Legislature phase out the program entirely, along with other economic incentive programs that it says distort the market and amount to a corporate giveaway (TPPF, 2013). The Texas Conservative Coalition Research Institute (2013) says that the program should be amended to prohibit districts from waiving the minimum job requirement, prohibit supplemental PILOT payments to districts, and remove renewable energy industries from program eligibility.

The renewable energy industry, meanwhile, has developed a high-value and tangible stake in the debate. In discussing the eligibility of renewable energy and jobs waivers programs, the industry states: "Renewable energy needs to remain, as it currently reads, in Chapter 313 with local control maintained when job waivers are considered" (Mirzatuny, 2013). The diverse group of stakeholders with material interests in the program may be a barrier to program reform. The ongoing political controversy over the program from session to session suggests that program reform is possible but may continue to be difficult given the coalition of interests with material benefits at stake.

INTERSECTION WITH THE SCHOOL FINANCE SYSTEM

The program's intersection with the state school finance system is strongly tied to the state's school aid policy and its allowance of PILOTs. As articulated by the Legislative Budget Board in the 2011 GEER report, districts do not bear the cost of the program since the value of the abatement is excluded from the district's property tax base for the purpose of state aid calculations, thus ensuring that the local district does not lose revenue from abatement deals. The cost of the program is borne by the "Foundation" portion of the school finance system which apportions the "state aid" component of district funding. Tier 1 of the Foundation School Program funds "basic education" expenses, such as maintenance and operations. Tier II provides supplemental funding. Districts receive remaining funding from the "Target School Program," which was instituted in 2006 and which is outside the scope of this report.

The Foundation School Program uses a state aid formula to award funding to schools based on: 1) need, and 2) revenue capacity. First, the state calculates the district's per pupil funding need, using a cost of education index and some other factors. The state then compute's the district's total funding allotment based on number of students in

different categories, such as special education needs, bilingual students, and other student types that might affect funding need. The state and district split cost of the total allotment. The local share is determined by multiplying the district's Maintenance and Operations tax rate by the taxable property value that it has been assigned by the Comptroller. A district's assigned property tax base thus bears significant influence on its share of the educational cost. If a district's need goes up, but its property tax base stays the same, it can expect to receive more funding from the state to make up the difference. If a state's need stays the same, but its property tax base increases, then it will pay a larger share of its own per pupil costs with local revenues. The Texas school finance system is multi-tiered and complex, and a more detailed discussion is outside the scope of this report. For a step-by-step review of how the system works, please see the Texas Taxpayers and Research Association publication from 2012.

Each year, the Comptroller's office conducts a Property Value Study that is used as the foundation for Tier I state school aid funding. Approved Chapter 313 abatements are exempted from districts' assigned taxable value, and therefore state aid to the district remains the same, despite an increase in industrial property investment over the span of the abatement agreement. To clarify, the program does not directly provide *additional* funding to districts that participate in abatements, but instead subsidizes the program by maintaining the district's level of aid despite the influx of additional property investment (Texas Taxpayers and Research Association, 2012).

Moreover, if the school's level of need increases (according to the standardized calculations in the Foundation School Program formulas), but its assigned property tax value and tax rate remains the same, the state makes up the difference. According to these principles, the state also subsidizes any additional costs that the district might incur from population growth, since the district's need grows but its revenue capacity remains static –

with the state making up the difference. In 2011, the Legislative Budget Board found that the program was revenue-neutral to local schools since the state subsidized the full cost of the program through its state aid policies.

Lastly, Texas' school finance system has important "wealth equalization" components that it adopted in response to a number of court rulings that declared the school finance system unconstitutional. In an effort to mitigate unconstitutional disparities in public education funding, caused by varying degrees of property wealth across districts, the state enacted a wealth equalization provision in 1993. This provision exists apart from the state aid calculations required by the Foundation School Program and requires districts whose taxable value per pupil exceeds a statutory threshold to return a portion of that revenue to the state to fund education in property-poor districts (SB 7, 1993).

Today, the wealth equalization regulations are contained in Chapter 41 of the Texas Education Code, giving the "Robin Hood" donor schools their name as "Chapter 41" districts. As part of this program, property-wealthy districts whose taxable property value per student exceeds a certain threshold ($504,000 per pupil in 2015), must give excess revenues back to the state to fund poor schools. This process, whereby the state reapportions revenue over the statutory threshold to property-poor schools, is called recapture" (Texas Education Agency, Office of School Finance, 2014). Districts can meet their Chapter 41 requirements in a number of ways, but most choose to either purchase "attendance credits" directly from the state or contract with a less-wealthy neighboring jurisdiction directly to educate a sufficient number of students to offset their excess revenues.

The intersection between Chapter 41 and the abatement program is complex. According to statute, TEA must "determine the wealth per student of a school district under [Chapter 41] as if any tax abatement agreement executed by a school district on or after

May 31, 1993, had not been executed" (Texas Education Code Chapter 41.009). When evaluating TEA's district state aid reports, it becomes clear that (as with state aid in the Foundation School Program) the value of abated property is exempted from the property tax base used to determine Chapter 41 status. That is, the formula that is used to determine Chapter 41 status, and the amount of local revenue subject to recapture, excludes the value of property that has been abated under a Chapter 313 agreement. As with the state aid formula policy, this means that the property value used to determines a school's donor status in the school finance system is artificially low. A district may be able to alter its Chapter 41 status and its state recapture obligations by offering abatements. In this way, wealthy districts can shelter their revenue from state redistribution requirements.

Thus, districts that might be obligated to cede a portion of their revenue to the state seek mechanisms to shelter their local revenue from recapture. Chapter 313 can act as one of these mechanisms. First, it offers a way for jurisdictions to reduce the amount of revenue they might owe back to the state. Second, districts can accept PILOTs from firms that exist outside of the property tax system entirely. Districts can reduce the amount they owe in recapture, while making up the lost revenue through firm side payments. Wealthy districts often perceive PILOTs as the only way to protect their revenues from recapture by the state school finance system. As the *Bay Area Houston Magazine* pointed out as recently as January, 2016, Chapter 313 agreements allow a district to hold on to funds that they would have otherwise lost by receiving payments-in-lieu-of-taxes from the firms. In short, the magazine reports, "Chapter 313 agreements can keep a greater percentage of funds in the local ISD" (Bay Area Houston Magazine, 2016).

A recent *Houston Chronicle* article reports on the Barbers Hill school district, which has been a Chapter 41 school for the last 17 years (Texas Education Agency, Chapter 41 data, 2016). The article features the district superintendent speaking proudly about the

district's $2 million private foundation, built from PILOT payments, that awards scholarships for teachers. Similarly, for the past 21 years, the Texas Education Agency has classified La Porte ISD as a property-wealthy school, and the district returns a portion of its tax revenue back to the state to fund property-poor schools. In 2014, LPISD reduced its assigned taxable property value by $92 million via Chapter 313 abatement agreements (Texas Comptroller of Public Accounts, Property Value Study, 2014. In 2015, the state recaptured over $20 million from LPISD, while LPISD continues to collect PILOTs from its abatement agreements. According to the most recent report on Chapter 313 from the Comptroller, LPISD has agreements for PILOTs totaling over $34 million (from the eight abatement agreements that it entered into between 2010 and 2014). PILOTs are voluntary agreements between districts and firms, but act as a powerful incentive for districts to participate in the agreement since they can confer large tangible benefits to districts that perceive themselves as losing local revenue to the state school finance system.

This paper, in part, attempts to elucidate whether property wealth and Chapter 41 status have any bearing upon a district's likelihood of participating in the abatement program. The program has not undergone any comprehensive evaluation to date and as such this paper will contribute to the body of literature available to inform policymakers on this issue.

CURRENT PROGRAM DATA

In 2014, fifty-three percent of the 259 active Chapter 313 projects were for renewable energy (Texas Comptroller of Public Accounts, 2014). Only 21% of the qualified property investment in districts, however, was for renewable energy. Seventy-six percent of the property investments came from the manufacturing sector. The renewable energy sector, therefore, is receiving a large percentage of the benefits while contributing

a minority percentage of property investment. This suggests that the program has strayed from its original function as an industrial and manufacturing incentive program. The current level of property investment by participating firms is estimated to be $123 billion (for all agreements and for their full lifespan of 8 to 10 years each). In 2014, the Comptroller estimated that the state paid $5.5 billion in gross tax benefits to firms, 72% of which went to renewable energy firms (Texas Comptroller of Public Accounts, 2014). This amounted to approximately $91,000 per job created in the program. It is notable that, because wind energy farms often lease their land from corporate or individual agricultural owners, the abatement program can act as an indirect subsidy to the agricultural sector, which receives rental payments from the wind farm corporations (US Government Accountability Office, 2004). Farmers and agricultural owners can often continue agricultural operations concurrently with leasing some portion of their land to wind farm companies.

As of fall 2015, according to Chapter 313 program data from the Texas Comptroller, 157 school districts maintained one or more active Chapter 313 abatement agreements. Barbers Hill ISD had the most, with 14 active abatement agreements on the books. Brazosport ISD had eight, and La Porte ISD had 7 (Texas Comptroller of Public Accounts, Chapter 313 data, 2015). In 2014, twenty-five percent of districts with an active abatement agreement were Chapter 41 schools, compared to only 22% of districts statewide (Texas Comptroller of Public Accounts, Chapter 313 data, 2014; Texas Education Agency, district Chapter 41 data, 2014). Eight percent were located in a major urban or suburban district, compared to only 4% statewide. The taxable value per pupil in Chapter 313 districts was $1.1 billion compared to only $681,000 statewide (Texas Comptroller of Public Accounts, Chapter 313 data and Property Value Study, 2014).

The Texas Comptroller of Public Accounts reported that, as of 2014, firms had paid or committed to paying over $826 million in supplemental payments (referred to as PILTS in the Comptroller's documents) to firms over the lifetime of all active agreements. The Comptroller reported that renewable energy firms returned 20% of the value of their tax break to districts through supplemental payments, whereas manufacturing projects returned only 13% through supplemental payments (Texas Comptroller of Public Accounts, 2014).

The following chapter provide a quantitative program evaluation of Chapter 313, exploring whether property wealth and Chapter 41 status influence program participation and whether granting abatements is associated with growth in the industrial property tax base.

Chapter 4: Methodology

This study employs a mixed methods approach to explore the efficacy of, and causal factors influencing selection into, Texas' school property tax abatement program. The study includes an econometric analysis of variables influencing districts' selection into the program and the effect of abatement participation on districts' industrial property tax base.

To contextualize the quantitative findings, this report also presents limited results from a qualitative survey of superintendents and school board presidents in districts that currently host a Chapter 313 abatement agreement. The objective of the survey is to obtain perspectives on Texas' tax abatement program from district officials who have had experience approving or administering the program. The following sections discuss the report's methodology and highlight limitations in the research design.

Regression Methodology

I model the regression and identification strategy on Dalehite's 2005 evaluation of the Indiana school property tax abatement program. Dalehite's study examines the program's effects on districts' property tax base and its implications for Indiana's public school finance system. Dalehite employs a two-step econometric technique whereby he estimates the probability of a district's selection into the abatement program using probit regression, calculates a self-selection adjustment term for each district based on its estimated probability of adopting an abatement (i.e. the Heckman correction), and finally incorporates this selection term into an OLS regression outcome model to ascertain the effect of abatement participation on districts' property tax base.

This paper replicates components of Dalehite's approach, making adjustments to the technique and variables based on my own judgment and data availability. I employ a

two-step approach but elect to use a propensity score matching model rather than the Heckman correction used by Dalehite. I make this choice based on the understanding that the Heckman correction is primarily employed in situations where outcomes for the "control" population are unobserved (Bushway, Johnson, and Slocum, 2007). The traditional example is when the researcher is evaluating a workforce participation program wherein she only has access to wage data for program participants, and not for nonparticipants in the general population.

However, I do have access to outcome data for the "control" population in this study (i.e. property value assessments for school districts that have not adopted a tax abatement). Therefore, I elect to use a propensity score matching model to control for effects of program self-selection. The matching model has some weaknesses, primarily resulting from a reduced sample size, that I discuss in this chapter. The following sections discuss the study population and regression model, which draw heavily upon Dalehite's 2005 work on Indiana. Tables and regression model design are adapted from Dalehite.

Study Period and Population

The population of interest is all 1,024 public school districts in the state of Texas in 2014. The full study sample actually consists of 999 districts. I removed fourteen districts from the original study population because they consolidated during the study period, and another 11 districts that were missing data on either property tax or population covariates. The Texas Legislature adopted Chapter 313 during the 2001 Legislative Session and the program took effect in 2002 with the first abatement agreements took effect in 2003. The most current property tax value data were available for 2014. Therefore, this study evaluates Chapter 313 between 2003 and 2014. Replicating Dalehite's approach, I evaluate program performance across three separate study periods: the early period (2003-

2007), the late period (2008-2014) and the full study period (2003-2014). I anticipate that evaluating the program over multiple periods will allow me to better assess program performance over time.

I define abatement participation as a district adopting at least one active Chapter 313 abatement agreement during the study period in question. I use the first year of the initial qualifying period as the start date for the abatement. Table 3 presents data on the number of unique districts adopting an abatement, by year, for each study period. Please note that some districts adopted abatements in both the early and later study periods. These districts were counted in both the early and late study groups, and then counted only once in the grand total. Therefore, the Grand Total column does not always equal the sum of the early and late study periods. Counts provided within each study period are cumulative.

Year	Early Period (2003-2007)	Late Period[a] (2008-2014)	Grand Total[b] (2003-2014)
By 2002	0	-	0
2003	3	-	3
2004	6	-	6
2005	10	-	10
2006	15	-	15
2007	25*	-	25
2008	-	23	41
2009	-	39	55
2010	-	45	61
2011	-	50	64
2012	-	60	73
2013	-	76	87
2014	-	115	128

Table 3: Number of Unique Districts Hosting Abatements by Year and Study Period

[a] The districts of Goldthwaite, Olney, and Webb adopted abatements during the late period from 2008-2014. However, they also consolidated between 2002 and 2014. I therefore excluded them from this analysis.

[b] Some districts adopted abatements during both the early and late periods. I count these districts in each respective period, and once in the full study period. Due to this redundancy across study periods, the early and late adoption groups do not sum to the abatement total.

Note: Adapted from Dalehite (2005) for Texas and this replication study.

For more information on data sources and definitions see the Appendix.

Modeling Approach

The regression model evaluates: 1) variables influencing districts' selection into Chapter 313 (i.e. the treatment) during each of the three study periods; and 2) after controlling for program self-selection, the effects of abatement participation on the industrial property tax base (i.e. outcome) during each study period. For each study period, districts take on a dummy variable value of 1 if they have adopted at least one Chapter 313 abatement during that time period or 0 if they have not. The study employs a quasi-experimental propensity-score matching design to better understand the effects of abatements on districts' industrial property tax base. Table 4 presents a simplified version of the counterfactual that this study explores.

Outcome Time 1	Treatment	Outcome Time 2
Industrial Property Tax Base (Time 1)	Tax Abatement	Industrial Property Tax Base (Time 2)
Industrial Property Tax Base (Time 1)		Industrial Property Tax Base (Time 2)

Table 4: Treatment Counterfactual

Propensity score matching is a two-step, quasi-experimental approach that can help control for differences in unobserved variables that arise due to treatment self-selection. Districts that choose to participate in the abatement program may differ in important ways from districts that choose to not participate – and these differences can affect the outcome variable. A propensity-score matching design creates a study sample that is more comparable with regard to key variables.

As a first step in the propensity score matching process, I use a logistic regression model to: 1) evaluate whether certain variables influence districts' selection into the abatement program, and 2) estimate the probability of Chapter 313 participation for each district. I then use those estimated probabilities to construct matched district pairs that are more comparable with regard to the selection covariates. This matching process helps control for observed, and hopefully some unobserved, variables that may influence districts' selection into the program. The logistic selection equation is as follows:

$$PPTA_t = \alpha X_{(t-1)} + u_t$$

Where $PPTA_t$ represents the probability of entering into a Chapter 313 agreement during the study period t; $X_{(t-1)}$ is a vector of selection variables measured during the year prior to the beginning of the study period; α is the parameter for each explanatory variable, to be estimated; and u_t is the error term for the study period.

The logistic model generates estimated probabilities from 0 through 1 for property tax abatement participation. After estimating these probabilities, I sort districts by estimated abatement probability (separately for each study period), pairing districts from the top of the sorted list down and extracting only matched pairs containing both an abatement and non-abatement district. I remove the unmatched non-abatement districts from the study sample. This produces a reduced sample for each study period, equal to twice the size of the participating Chapter 313 population, that is better matched on the selection model covariates.

Finally, I use the reduced sample, containing only the matched pairs, to evaluate the effects of abatement participation on districts' industrial property tax base. I use a fixed effects OLS regression model, introducing additional covariates that Dalehite identifies as

potential contributors to changes in industrial property tax base over time. The OLS outcome equation is as follows:

$$\Delta PTV_t = \beta \Delta Z_t + \delta PTA_t + \Delta \varepsilon_t$$

Where PTA_t is a dummy variable of either 0 or 1 representing abatement participation during the study period t; δ is the parameter for abatement participation, to be estimated; ΔZ_t is a vector representing the change in population and fiscal covariates over the course of the study period; β is the parameter defining the effects of the changes in covariates over the study period, to be estimated; ΔPTV_t represents the change in industrial property value assessment over the course of the study period; and $\Delta\varepsilon_t$ is the error term for the model. The following sections describe the explanatory variables that I include in each model.

Selection Model Variables

To predict Chapter 313 abatement participation, I draw heavily from the list of regressors that Dalehite uses in his evaluation of the Indiana abatement program. The following section contains a description and justification for each variable. See Table 5 for a concise description of all variables in the selection model and the Appendix for more information on data sources.

Dependent Variable

The dependent variable for the selection model is a district's abatement participation. I define this as a dummy variable that takes a value of 0 if the district has granted no active abatements during the study period, or a value of 1 if it has granted at least one active abatement during that time period. I assign a value of 0 if the qualifying abatement agreement was cancelled by either the district or Comptroller due to noncompliance. I replicate the approach taken by Dalehite.

The dependent variable may differ across study periods: 2003-2007, 2008-2014, and 2003-2014. While Dalehite drops all early-adopting districts from his evaluation of the late study period, I elect to keep the early adopting districts in the later study sample, coded as a 0 if they do not adopt an additional abatement during the later period. Some districts choose to adopt multiple abatements over time. I do not wish to exclude districts that grant abatements during *both* time periods from evaluation in later years since these districts are making repeated decisions to opt into treatment, with potential implications for selection probability estimates.

Variable	Description
earlyabate (eb)	1=adopted an active abatement agreement between 2003 and 2007; 0=all else
latabate (lb)	1=adopted an active abatement agreement between 2008 and 2014; 0=all else
allabate (ab)	1=adopted an active abatement agreement between 2003 and 2014; 0=all else
tax rate	district's tax rate per $100 (M&O and I&S) (2002 for eb and ab, 2007 for lb)
tot tax value/pup	total taxable value of property per pupil (2002 for eb and ab, 2007 for lb)
assess ind/pup	total assessed industrial property value per pupil, (2002 for eb and ab, 2007 for lb)
assess resid/pup	total assessed residential property per pupil (2002 eb and ab, 2007 lb)
urban status	1=if district classified as "Major Urban" or "Major Suburban" by TEA; 0=all else (2002 for eb and ab, 2007 for lb)
% edu dis	% of students receiving a free or reduced price lunch (2002 for eb and ab, 2007 for lb)
Δ fed fund[a]	decline in federal funding per pupil (from 98-02 for eb and ab, 02-07 for lb)
total chapter 312	# of Chapter 312 agreements in overlapping city or county jurisdictions (2002 for eb and ab, 2007 for lb)
chapter 41 status	1=has Chapter 41 status; 0=all else (2002 for eb or ab, 2007 for lb)

Table 5: Variable Descriptions for Logistic Selection Model
Note: For information on data sources, see the Appendix.
[a] Expressed in inflation-adjusted 2002 or 2007 dollars, respectively
Note: Adapted from Dalehite (2005) for Texas and this replication study.

Independent Variables

The following sections contain more detailed descriptions of the independent selection variables. Independent variables are primarily fiscal and are informed by the literature on abatement participation, Dalehite (2005), and the Texas context.

Tax Rate:

When controlling for property tax base, the tax rate is an indicator of either fiscal stress or health (Dalehite, 2005, 44). This variable helps to test the hypothesis that fiscal duress influences the probability of granting an abatement. Given contradictory findings from the literature on the fiscal stress and health hypotheses, I do not offer a prediction regarding the sign of the tax rate variable in Texas.

Total Taxable Value per Pupil:

As Dalehite articulates, taxable property value is the primary determinant of a district's ability to fund education and also determines how much state aid the district receives. This is true in both Texas and Indiana. Dalehite's study finds that the taxable value of personal property predicts abatement participation. Given Dalehite's findings in Indiana and the incentives provided by Texas' program design, I hypothesize that school districts with a greater preexisting ability to finance public education will be more likely to grant tax abatements. Dalehite breaks out taxable value according to real and personal property classification. Unfortunately, this breakout is unavailable in Texas due to a number of exemptions that apply to both real and personal property.

Assessed Industrial and Residential Value per Pupil:

To compensate for the lack of data on *taxable* real and personal property, I include *assessed* industrial and residential property value in the model. I anticipate that these variables will elucidate whether residential or industrial property drives abatement participation. Even though the taxable value for each of these property classes is

unavailable, these variables represent an improvement over Dalehite's real versus personal property classification. Due to lack of data in Indiana, Dalehite uses personal property as a proxy for industrial property, and real property as a proxy for residential. However, Texas provides direct data on assessed industrial and residential property, therefore negating the need for a proxy variable.

I anticipate that these variables, in conjunction with the total taxable value variable, will provide more specific insight into the property classes that drive abatement participation. Dalehite predicts and finds that personal property wealth is associated with a higher probability of abatement participation, while real property is associated with a lower probability. Given his findings, I anticipate a replication in Texas.

Urban Status:

Dalehite includes a population density variable in his model to control for the influence of urban geography on abatement participation. However, the Texas Education Agency (TEA) provides its own urban and rural classification criteria for districts. Given that estimates of school district population density are subject to margins of error (from the American Community Survey), I elect to use the uniform classifications provided by TEA. I define urban status as a dummy variable taking the value of 1 for districts that TEA classifies as either "major urban" or "major suburban," since both of these categories reflect major population centers. The dummy variable takes a value of zero if otherwise. I anticipate the direction to be positive.

Percent of Students Educationally Disadvantaged:

Dalehite includes Indiana's educational cost index in the model to assess whether districts with a higher concentration of children in poverty are more likely to offer abatements. Literature demonstrates that students living in poverty have a higher per pupil

expenditure need, and therefore the percentage of students who are educationally disadvantaged affects districts' level of fiscal stress. I elect to include the percentage of students who are educationally disadvantaged, referring to the percent who are eligible to receive free and reduced price lunch, as an indicator of need.

I use this variable, rather than Texas' cost of education index (cei) because the Legislature has not updated the cei since 1990. Thus, while the cost index may affect the level of state aid that a district receives in Texas, it is does not necessarily reflect districts' current level of need. As with the tax rate variable, the sign for this variable could be either positive or negative.

Change in Federal Funding per Pupil:

If the fiscal stress hypothesis holds, then districts experiencing reduced federal funding should be more likely to adopt abatements. Dalehite includes this variable in the selection model particularly because the 1980s constituted a time of significant devolution and retraction of federal funding from local schools. While this dynamic may not be as pronounced for the current study periods, I include this variable to control for any similar effects.

Number of Overlapping Chapter 312 Agreements:

I include this as an original variable, in addition to the aforementioned variables that Dalehite evaluates. Literature suggests that jurisdictions may be more likely to offer abatements when neighboring jurisdictions offer abatements, and that jurisdictions offering abatements continue to offer more abatements over time. In other words, some literature posits that abatement participation creates a positive feedback loop for abating jurisdictions and their neighbors. Texas administers a municipal and county tax abatement program in addition to the school property tax abatement program. In order to account for potential

effects of these abatements on school district abatement participation, I include a variable representing the number of Chapter 312 (municipal or county) tax abatements offered in overlapping jurisdictions in the year immediately prior to the study period.

Chapter 41 Status:

This variable is also an original addition to the model. In Texas, districts whose taxable value per pupil exceeds a level defined in state statute become donors to the school finance system. Revenues per pupil over the statutory threshold are funneled to the state to fund education in property-poor school districts. These donor schools are known as "Chapter 41" schools in reference to the associated chapter in the Texas Education Code. This variable will help test my hypothesis that the programmatic features of Chapter 313 incentivize participation from schools that are required to funnel revenues to the state.

Tables 6, 7, and 8 provide descriptive statistics on the selection model variables for each study period.

Group	Variable	Mean	SD	Min	Max
Early Abater (n=25)	tax rate 02	1.56	0.13	1.32	1.79
	tot tax value/pup 02[a]	4.83	5.41	0.56	27.09
	assess ind/pup 02[a]	2.43	5.24	0.00	24.53
	assess resid/pup 02[a]	1.05	1.03	0.05	3.97
	urban status 02	0.48	0.51	0.00	1.00
	% edu dis 02	41.28	18.56	0.00	76.10
	Δ fed fund 98-02[b]	-180.46	145.44	-549.23	51.83
	total chapter 312 02	1.64	2.93	0.00	13.00
	chapter 41 status 02	0.36	0.49	0.00	1.00
Controls (n=974)	tax rate 02	1.54	0.14	0.91	2.00
	tot tax value/pup 02[a]	2.72	3.25	0.04	40.69
	assess ind/pup 02[a]	0.32	0.89	0.00	12.24
	assess resid/pup 02[a]	0.87	1.08	0.00	13.78
	urban status 02	0.25	0.44	0.00	1.00
	% edu dis 02	48.06	19.42	0.00	100.00
	Δ fed fund 98-02[b]	-201.19	230.40	-2320.53	2493.04
	total chapter 312 02	0.50	2.38	0.00	64.00
	chapter 41 status 02	0.08	0.27	0.00	1.00

Table 6: Descriptive Statistics for Districts, Early Abatement Period (2003-2007)
[a] Expressed in hundreds of thousands of 2002 dollars
[b] Expressed in 2002 dollars

Group	Variable	Mean	SD	Min	Max
All Abaters (n=128)	tax rate 02	1.53	0.14	1.04	1.94
	tot tax value/pup 02[a]	4.21	5.46	0.55	40.69
	assess ind/pup 02[a]	1.01	2.70	0.00	24.53
	assess resid/pup 02[a]	0.68	0.62	0.02	3.97
	urban status 02	0.25	0.43	0.00	1.00
	% edu dis 02	49.63	19.02	0.00	88.70
	Δ fed fund98-02[b]	-209.46	158.88	-681.12	55.77
	total chapter 312 02	0.61	1.57	0.00	13.00
	chapter 41 status 02	0.18	0.39	0.00	1.00
Controls (n=871)	tax rate 02	1.54	0.14	0.91	2.00
	tot tax value/pup 02[a]	2.56	2.83	0.04	36.57
	assess ind/pup 02[a]	0.28	0.80	0.00	12.24
	assess resid/pup 02[a]	0.90	1.13	0.00	13.78
	urban status 02	0.26	0.44	0.00	1.00
	% edu dis 02	47.64	19.47	0.00	100.00
	Δ fed fund 98-02[b]	-199.38	237.20	-2320.53	2493.04
	total chapter 312 02	0.52	2.49	0.00	64.00
	chapter 41 status 02	0.07	0.26	0.00	1.00

Table 7: Descriptive Statistics for Districts, Full Study Period (2003-2014)
[a] Expressed in hundreds of thousands of 2002 dollars
[b] Expressed in 2002 dollars

Group	Variable	Mean	SD	Min	Max
Late Abaters (n=115)	tax rate 07	1.17	0.13	0.88	1.53
	tot tax value/pup 07[a]	8.24	13.63	0.80	85.71
	assess ind/pup 07[a]	1.27	2.43	0.00	19.78
	assess resid/pup 07[a]	0.84	0.65	0.02	4.46
	urban status 07	0.23	0.42	0.00	1.00
	% edu dis 07	54.58	17.17	19.50	93.80
	Δ fed fund 02-07[b]	969.65	699.30	0.00	3762.87
	total chapter 312 07	0.80	1.81	0.00	9.00
	chapter 41 status 07	0.26	0.44	0.00	1.00
Controls (n=884)	tax rate 07	1.19	0.14	0.73	1.67
	tot tax value/pup 07[a]	4.10	5.40	0.03	64.13
	assess ind/pup 07[a]	0.44	1.24	0.00	18.27
	assess resid/pup 07[a]	1.34	1.99	0.00	29.53
	urban status 07	0.28	0.45	0.00	1.00
	% edu dis 07	52.76	18.66	0.00	99.90
	Δ fed fund 02-07[b]	876.86	1182.63	-463.51	27322.30
	total chapter 312 07	0.58	1.70	0.00	17.00
	chapter 41 status 07	0.13	0.34	0.00	1.00

Table 8: Descriptive Statistics for Districts, Late Study Period (2008-2014)
[a] Expressed in hundreds of thousands of 2007 dollars
[b] Expressed in 2007 dollars

Outcome Model

To estimate the effect of abatement participation on districts' industrial property tax base, and by inference on industrial firm investment, I continue to draw from the list of regressors that Dalehite uses in his evaluation of the Indiana abatement program. The following section contains a description and justification for each outcome model variable. See Table 9 for a concise description of all variables in the outcome model.

Dependent Variable

The dependent variable for the outcome model is change in assessed industrial property value over the course of the study period (i.e. 2003-2007, 2008-2014, or 2003-2014). In his study, Dalehite uses assessed *personal* property value as a proxy for industrial investment. However, Texas provides data on industrial property tax assessments. This should improve the specificity and validity of the outcome model.

Variable	Description
eb	1=adopted an active abatement agreement from 2003-2007; 0=all else
lb	1=adopted an active abatement agreement from 2008-2014; 0=all else
totabate	1=adopted an active abatement agreement between 2003-2014; 0=all else
Δ assess ind/pupil	Change in assessed industrial property value per pupil (in either ’07 or ’14 dollars)
Δ tax rate	Change in district’s total tax rate per $100 (M&O and I&S together)
Δ exp/pupil[a]	Change in expenditures per pupil (in either ’07 or ’13 dollars)
Δ educational attain.[b]	Change in the percentage of the population over age 25 with a high school degree or higher
Δ pov	Change in the percentage of children living in poverty
Δ pop share	Change in the district’s share of the state population

Table 9: Variable Definitions for OLS Outcome Model

[a]The most recent expenditure per pupil data from TEA were for the 2012-2013 academic year.

[b] Educational attainment data were only available for the year 2000 from the Decennial Census and 2009 from the 5-year ACS estimates. Therefore, the change in educational attainment is measured from 2000-2009, 2000-2014, and 2009-2014 for each study period, respectively.

Note: Unless otherwise specified, Δ refers to change over the course of one of the following study periods: 2003-2007, 2003-2014, or 2008-2014. For notes on data sources, see the Appendix. This table was adapted from Dalehite (2005) for Texas and this replication study.

Independent Variables

I test the following variables to evaluate their effect on districts’ industrial property tax base. The outcome model uses a fixed effects OLS regression approach that contains only the matched pairs from the selection model for each study period. The model controls, therefore, for fixed effects and covariates from the selection model. As Dalehite explains, influential factors that vary across states are not relevant to this intra-state study, as those variables (e.g. energy costs) can be considered fixed effects. They are expected to be constant across districts. Some intra-state and intra-regional variables such as transportation infrastructure, additionally, can be considered fixed effects within the limited duration of the study period from 2003-2014. Dalehite identifies the following as influential at the intra-regional and intra-state level.

Abatement Participation:

The most important independent outcome variable is the dummy for abatement participation, constituting the "treatment" in this quasi-experiment. Districts are assigned 1 if they have granted at least one abatement during the study period and 0 if not. Dalehite's results show that abatement participation is associated with an increase in personal property tax assessment. However, given the mixed findings in the literature on the effect of abatements on firm siting, I do not offer a hypothesis on the direction of this variable.

Additionally, Dalehite runs three outcome regression models, assessing the effect of early and late abatement adoption on districts' industrial property tax base during three periods. I choose to run four outcome regression models. I assess the effects of *early* abatement adoption on growth in the industrial tax base between 2003 and 2007, as well as between 2003 and 2014. I include the longer-term early abatement model to examine evaluate whether effects occur over a longer-term period. I then assess the effects of abatement adoption over the course of the whole study period from 2003-2014, and the effects of late abatement adoption during the late period from 2008-2014.

Change in the Tax Rate:

Additional fiscal variables may affect the growth or reduction in industrial property values over time. In particular, Dalehite includes the nominal tax rate as a variable that may influence industrial property investment. I have already controlled for this variable in the propensity score matching process, so I anticipate some collinearity. As Dalehite explains, the school district tax rate is only partially reflective of the local tax burden faced by firms. Municipal tax rates also play a role. However, accurately assessing the total tax burden faced by firms from overlapping jurisdictions is complex and beyond the scope of this report. I have already controlled for Chapter 312 adoption by overlapping jurisdictions, and the school district tax rate is more easily measurable and localized to the district itself. Therefore, I continue Dalehite's approach and use the district-level variable.

Change in Expenditures per Pupil:

Following Dalehite's example, I also control for change in expenditures per pupil over the course of the study period. Dalehite proposes this as an indicator of educational quality and investment in the labor force. Education investments, he posits, may make the district more attractive to firms seeking a skilled labor pool. Educational expenditures are only a proxy for quality, however, and may be somewhat endogeneous with the dependent variable, as investments per pupil may increase as industrial firm siting increases. There may also be some collinearity with tax rates. These limitations are present and identified in Dalehite's work, as well.

Despite these weaknesses, this may be the best measure of educational investment and quality available. The Texas Education Agency provides some data on test scores, but data are unavailable for key study years for a large percentage of schools in the sample. Not wanting to bias the results, I elected to follow Dalehite's approach and include change in educational expenditures per pupil in the model.

Change in Educational Attainment:

The second educational variable that I incorporate is educational attainment, using American Community Survey (ACS) district-level data. I incorporate educational attainment as a proxy for labor pool quality, as does Dalehite. In my model, I define educational attainment as the percentage of the population over 25 that has a high school degree or higher. Dalehite defines it in the inverse – the percentage without a high school degree. Please note that ACS data, especially at the district level are subject to large margins of error. Due to limited availability of comparable data, I elected to use 5-year ACS estimates and Census data, although the comparison years are not precisely aligned

with the study periods. I use ACS and Census data for the following periods: 2000-2009, 2000-2014, and 2009-2014.

Change in Child Poverty Rate:

Using the Small Area Income and Poverty Estimates (SAIPE), I include poverty rate in the model as a population factor that may influence firm siting. Dalehite includes this variable and posits that firms may choose not to locate in areas with high levels of poverty. He interprets poverty level as a type of "amenity," or lack thereof – with low poverty rates being a potential point of attraction for firms. I use the share of the population of children living in poverty, which is similar to Dalehite's measure. As with ACS data, SAIPE data are subject to margins are error, but are designed to provide small area estimates such as for school districts.

Change in Share of State Population:

To reflect migration and labor pool trends, I include change in share of the state population over the study period. Dalehite also incorporates this variable. I use SAIPE data for this indicator because estimates are available at the district level for the desired years.

Table 10 presents descriptive data for the outcome model variables in each study period.

Study Period	Variable	Mean	SD	Min	Max
2003-2007 (Early Period 1) n=50	Δ assess ind/pupil[a]	1622.56	3673.57	-1623.58	17820.44
	Δ tax rate[b]	0.50	0.51	0.00	1.00
	Δ exp/pupil[c]	-3.98	1.18	-6.90	0.20
	Δ educational attain	953.46	2264.97	-6713.30	9585.59
	Δ pov	4.40	5.68	-13.81	19.10
	Δ pop share[d]	-0.02	2.50	-5.72	5.92
2003-2014 (Early Period 2) (n=50)	Δ assess ind/pupil[e]	-4623.68	15057.66	-76413.59	8331.71
	Δ tax rate[b]	0.00	0.00	0.00	0.00
	Δ exp/pupil[f]	2420.05	6833.80	-5974.61	44680.13
	Δ educational attain	5.60	5.26	-8.75	17.86
	Δ pov	1.86	5.56	-11.51	13.40
	Δ pop share[d]	-20.79	49.48	-263.40	-0.13
2003-2014 (Full Period) (n=256)	Δ assess ind/pupil[e]	-1386.23	8982.01	-83547.37	9138.76
	Δ tax rate[b]	0.00	0.00	0.00	0.00
	Δ exp/pupil[f]	1986.77	6873.35	-11515.09	80987.34
	Δ educational attain.	6.41	6.16	-43.16	21.01
	Δ pov	1.75	5.97	-16.77	27.23
	Δ pop share[d]	-9.46	25.74	-263.40	-0.06
2008 – 2014 (Late Period) N= 230	Δ assess ind/pupil[e]	1680.53	6326.89	-19525.86	53825.41
	Δ tax rate[b]	0.00	0.00	0.00	0.00
	Δ exp/pupil[f]	-881.13	7604.76	-33024.48	79515.07
	Δ educational attain.	2.49	5.38	-23.90	17.53
	Δ pov	1.55	5.81	-15.80	24.49
	Δ pop share[d]	-6.47	18.69	-207.17	0.00

Table 10: Descriptive Statistics for Districts in Outcome Model, by Study Period

[a] Expressed in hundreds of thousands of 2007 dollars
[b] Expressed in tenths of a percent
[c] Expressed in 2007 dollars
[d] Expressed in hundredths of a percent
[e] Expressed in hundreds of thousands of 2014 dollars
[f] Expressed in 2013 dollars

Limitations

As with any non-experimental study, there are limitations inherent in the regression and propensity score matching approach. The design cannot fully control for unobserved, omitted variables. Unobserved differences between abating and nonabating districts may be responsible for some of the observed differences in abatement participation or industrial property growth. Social scientific research is often subject to omitted variable bias, since experimental methodologies are unavailable in most social contexts. Therefore, quasi-experimental methods that mitigate, but do not eliminate, this source of bias must suffice.

For example, this study only measures effects from tax abatements adopted during one or more of the defined study periods. It does not provide analysis on the effects of any pre-existing school property tax abatement agreements that districts may have previously adopted under Chapter 312 (prior to the enactment of Chapter 313). The selection model tries to account for the presence of Chapter 312 agreements at the city or county level, but does not include historical school property tax abatement agreements that may have some influence on districts' growth trajectory. Limiting the study to a single program brings consistency to the model and allows me to control for program design differences. However, it may also introduce bias if prior abatement agreements affect either participation in Chapter 313 or changes in the industrial property tax base. I also exclude transit accessibility variables from this study. Future research may wish to control for the effects of additional variables, including but not limit to pre-existing abatements and transit access.

A second limitation inherent in regression modeling is model misspecification – that is, the relationship between variables may be nonlinear. The models that I use assume a linear relationship, and I do not incorporate any interaction terms. I do perform a linktest on the selection model to ascertain whether the model is correctly specified, the results of which are discussed in Chapter 5. Future research may wish to incorporate interaction terms to mitigate against any misspecification. There is also risk of collinearity between related variables, which would jeopardize the validity of the regression coefficients. I perform tests for collinearity on the selection and outcome variables, the results of which I present in Chapter 5.

A weakness specific to the propensity score matching design is the limited size of the constructed samples. In a propensity score matching design, multiple observations are dropped from the original population in order to create a sample that is better balanced on

the selection covariates. While the new samples may be more comparable, their small size can make it more difficult to achieve statistically significant model estimates. In this study, only the outcome models are subject to risks imposed by a small sample size.

Outcome sample size may be of particular concern for the early study period (2003-2007) which includes only 50 observations. The literature presents mixed recommendations as to how large a sample must be in order to provide statistically significant results. This challenge is frequently present in propensity score matching in the social sciences and is not unique to this study. Holmes and Olsen (2010) discusses the different ways to use propensity scoring in social science research, and future research on Chapter 313 may wish to employ an alternative methodology that is not subject to the weakness of small sample sizes.

Measurement error is also a possibility for each of the individual variables. There are margins of error in school district population estimates, for example, that may cause bias in the study results. Similarly, it is possible that the child poverty rate may have a different effect on the study outcome than the adult poverty rate. I have operationalized each variable as similarly to Dalehite's study as possible, but in many cases have had to adapt the variable based upon what data are available in Texas. There are numerous ways to operationalize most of the concepts discussed in this report, and I have attempted to choose the most effective method.

Lastly, it should be emphasized that this evaluation tests the effects of the abatement program on *district*-level firm siting decisions. Nor does the study offer a cost-benefit analysis of the program. While important, these questions are beyond the scope of this report. This study attempts to evaluate whether the program induces siting at the district level in an effort to understand whether the program exacerbates property wealth inequities in the school finance system.

Similarly, external validity is likely a challenge, due simply to the complexity and uniqueness of Texas' abatement program and school finance system. Findings from this study may bear some importance for states operating programs with similar features. However, the reader should be cautious against making generalizations about abatements or school property tax abatements from a state and program with very specific design features.

SURVEY DESIGN

To help contextualize the quantitative findings, I conduct an electronic survey of school board officials. Due to the limited response rate, findings from the survey are presented in tandem with the discussion of quantitative findings in Chapter 6. I do not present standalone survey findings in this report. The following sections describe methodological choices for the survey.

Participants

The author electronically surveyed 153 school district superintendents and 92 school board presidents in Texas school districts hosting at least one active abatement agreement. Of the population that received the online survey through e-mail, 11 superintendents (7%) and 5 school board presidents (5%) completed the survey. There are currently a total of 157 public school districts hosting active abatements and 1,024 public school districts statewide. The survey population, therefore, represents a partial and selective sample, limited by the availability of contact information for school officials and the low survey response rates.

Materials

The survey was conducted online via the Qualtrics electronic survey platform. The authored e-mailed the survey to school board presidents and superintendents. The survey

was comprised of 44 questions about participants' attitudes toward and experience with the Chapter 313 program. Participants did not necessarily answer all 44 questions, but were instead directed to the appropriate branch of questions given their responses to previous questions.

Limitations

Due to selective sampling and low response rates, there are significant limitations to the survey data presented in this report. The data cannot be considered representative, for the reasons articulated below. Data should be considered only as contextual and as a partial foundation for further research. One significant limitation is that the data represent only the perspectives of officials in districts hosting abatements. It is possible – even likely – that officials in districts not hosting abatements have different perspectives on the program.

Second the author was not able to obtain an e-mail address for each superintendent and school board president in the 157 districts hosting abatements. There is no comprehensive e-mail directory of school district officials available to the public. As such, the researcher constructed the survey list manually (collecting officials' e-mail addresses from public websites or by phone call to the district). While e-mail addresses for most superintendents were readily available, a large percentage of school board presidents declined to provide e-mail contact information to the public. It is possible that school board members who maintain and make available a public e-mail account differ from the population of school board members who do not make an e-mail address available.

Finally, the very low response rate means that the sample cannot be taken as representative – even of the narrow population who received the survey. Given these limitations, I recommend that survey results be considered in the context of the findings

from the rest of the report and used as the foundation for future research questions. The reader should not to make inferences about the larger population of school superintendents and board presidents based solely on survey results.

Chapter 5: Regression Results

The previous chapter describes the regression and survey methodologies that I use to explore districts' participation in the tax abatement program and the effects of participation on firm siting. This chapter presents regression results for the tax abatement selection and outcome models, which I obtain through a multivariate, propensity score matching research design. The identification strategy and research design draw heavily from Dalehite's 2005 evaluation of the Indiana property tax abatement program, which utilizes probit regression and the econometric Heckman correction to control for the effects of districts' self-selection into the abatement program.

In this study, I identify variables that may influence districts' decision to participate in the program, drawing heavily from Dalehite's 2005 program evaluation. I use logistic regression to identify the factors that most influence program participation and estimate probabilities of participation for each district. Using these estimated probabilities, I construct matched district pairs for three study periods over the life of the program. Using only these matched pairs, I then estimate the effect of program participation on industrial property tax values. For the outcome model, I use multivariate OLS regression techniques, employing a fixed effects model for the paired matches and additional outcome covariates identified by Dalehite (2005). The following sections present the results from the selection and outcome regression models.

SELECTION MODEL RESULTS

The abatement selection model is designed to predict which districts will choose to participate in the abatement program and to illuminate which variables predict participation. I estimate the probability of participation using a multivariate logistic regression model. Results from the logistic regression will help reveal whether property

wealth predicts participation, as hypothesized. Drawing inspiration from Dalehite's 2005 two-step approach, I use the estimated probabilities of participation to construct matched pairs that will help mitigate against self-selection bias in the outcome model. I include variables that Dalehite identifies in his 2005 treatment of the Indiana school district tax abatement program, and adapt them to reflect the available data in Texas.

Collinearity and Specification Tests

I perform two preliminary diagnostic tests to identify potential sources of error in the model. First, I perform a collinearity test using the Variance Inflation Factor (VIF). Collinearity among covariates can skew coefficients for individual predictors and produce lower levels of statistical significance than if the collinear terms were not included together.

The results from the collinearity analysis show a VIF of below 2.5 for all variables in the model, for each of the three study periods (see Table 11). A rule of thumb is that VIFs of over ten indicate collinearity problems. Therefore, where VIF values are between 0 and 2.5, some mild collinearity is indicated, but nothing that exceeds standard practice or that would jeopardize the predictors' coefficients or levels of significance.

Replicating Dalehite's approach, and in order to gauge whether I correctly specified the model, I perform a linktest on the model for each study period. The linktest is designed to identify specification errors in a model and can be performed with a command in Stata. It is derived from the work of Tukey (1949) and Pregibon (1980). The test works by regressing the dependent variable (i.e. abatement participation) on the linear predicted values of the dependent variable from the regression model *and* a linear term representing the square of predicted values. If a model is correctly specified (i.e. contains the correct predictor variables and applies the correct functional form), then the introduction of additional variables should not improve the performance of the model in a statistically

significant way. Therefore, a model passes the linktest if the predicted value term is statistically significant and the squared term is *not.* The level of significance of the predicted and squared linktest terms are provided in Table 12 in the rows hat and hatsq, respectively

The linktest results for the predicted value term are statistically significant at below the 0.10 level for each study period. This suggests that the variables that I have included in the model are appropriate. The 2003-2007 and 2008-2014 models also have a statistically *insignificant* squared term (hatsq), indicating that the model has been correctly specified and that additional variables or a different functional form would be unlikely to alter the predictive power of the model.

However, the regression for the full study period from 2003-2014 has a squared term that *is* statistically significant at below the 0.10 level. This p-value suggests the possibility of omitted variable bias or misspecified functional form (i.e. a nonlinear relationship). In an attempt to correct this potential specification error, I iteratively added and removed a number of interaction terms from the model. These efforts, however, did not improve the performance of the model on the linktest. In fact, the inclusion of additional interactive terms, while failing to improve the performance of the model for the 2003-2014 period, sometimes compromised the performance of the model for other study periods. Therefore, I opted to move forward with the model as identified in Chapter 4, with the caveat that an omitted variable may introduce bias into the selection results for the full study period from 2003-2014.

During the model identification and specification process, I tested the addition of the following interaction terms, but they did not improve the performance of the model:

- Interaction between assessed or taxable property values and educationally disadvantaged students

- Interaction between Chapter 41 status and educationally disadvantaged students
- Property tax values squared

Variable	VIF (03-07 and 03-14)	VIF (08-14)
tax rate	1.24	1.31
tot tax value/pup	2.01	1.82
assess ind/pup	1.36	1.44
assess resid/pup	1.36	1.32
urban status	1.24	1.23
% edu dis	1.43	1.21
Δ fed fund	1.26	1.13
total chapter 312	1.04	1.97
chapter 41 status	2.1	1.25
Mean VIF	1.45	1.41

Table 11: Variance Inflation Factors by Study Period

Selection Model Results

Predictive Power

Table 12 presents logistic regression results for all three study periods. All regressions are highly significant (at below the 0.01 level). However, the pseudo R-squared is low for all three periods, indicating that the predictive power of the model is limited. The model is most predictive for the early period from 2003-2007, during which time it predicts 14% of variation in abatement participation. Regressions for the 2003-2014 and 2008-2014 periods predict only 5% and 8% of the variation, respectively. The low R-squared for each study period could be the result of an omitted variable, especially in the 2003-2014 study period which does not pass the linktest. However, it could also be the result of inherent variability in program participation. The selection model, at its best, explains 14% of variation in the dependent variable, calling for some modesty in drawing inferences.

	2003 - 2007				2003 - 2014				2008 - 2014			
	Coef	OR	Sig		Coef	OR	Sig		Coef	OR	Sig	
tax rate	0.04	1.04	0.98		0.43	1.53	0.59		0.83	2.72	0.34	
tot tax value/pup	-0.07	0.93	0.47		0.09	1.09	0.01	*	0.04	1.04	0.01	*
assess ind/pup	0.28	1.32	0.02	*	0.26	1.29	0.01	*	0.18	1.19	0.01	*
assess resid/pup	-0.06	0.94	0.78		-0.32	0.72	0.06	*	-0.51	0.59	0.01	*
urban status	0.95	2.60	0.05	*	0.17	1.18	0.50		-0.04	0.95	0.89	
% edu dis	-0.01	0.99	0.57		0.01	1.01	0.25		0.01	1.01	0.29	
Δ fed fund	0.00	1.00	0.68		0.00	1.00	0.94		0.00	1.00	0.30	
total chapter 312	0.04	1.04	0.21		0.02	1.02	0.57		0.12	1.12	0.03	*
chapter 41 status	1.50	4.49	0.05	*	-0.02	0.98	0.96		0.17	1.23	0.66	
constant	-4.05	0.02	0.12		-3.13	0.04	0.01	*	-3.27	0.03	0.00	*
Log Likelihood	-100.66				-360.58				-329.24			
Pseudo R2	0.14 *				0.06 *				0.08 *			
Prob > chi2	0.00				0.00				0.00			
Hat (ltest)	0.07				0.00				0.00			
Hatsq (ltest)	0.94				0.06				0.63			

*statistically significant at below the 0.10 level
Note: OR=Odds Ratio; Total taxable, assessed industrial, and assessed residential property value per pupil expressed in hundreds of thousands of dollars.

Table 12: Selection Model Results

The characteristics of the logistic regression design itself could also contribute to the low R-squared. The logistic regression model requires the treatment variable to take on dummy status over a given time period for each district. The predictor variables, however, are measured at a single point in time prior to the study period, rather than at a point in time immediately prior to the district's decision to adopt an abatement. If predictor variables fluctuate throughout the study period, and abatement decisions are induced by short-term fluctuation in covariates, this could introduce bias into the logistic regression estimates. The 2003-2014 study period may be especially vulnerable to this potential bias, given that it attempts to predict abatement participation over the span of 12 years from single 2002 point-in-time predictors.

Individual Predictors

The model's low predictive power as a whole, however, does not preclude the identification of meaningful individual predictors. Even with strong variability in program participation across the study population, the model highlights statistically significant trends in the data. In particular, the effect of assessed industrial property value per pupil (expressed in hundreds of thousands of dollars) is statistically significant at below the 0.05 level across all study periods. For the full 2003-2014 study period, the odds ratio indicates that each additional $100,000 of assessed industrial property per pupil is associated with a 29% increase in the odds of abatement adoption. Odds ratios for the industrial value per pupil are slightly higher (1.32) and lower (1.19) for the early and late study periods, respectively.

The next two variables of importance are total taxable value and assessed residential property per pupil. These variables are statistically significant only for the full and late study periods. For the full study period, an additional $100,000 in total taxable value is associated with a 7% increase in the odds of adopting an abatement. Residential property per pupil has a negative directional effect, with an increase of $100,000 associated with reduced odds of adopting an abatement (.72 and .59 for each study period, respectively). These findings together indicate that, holding constant all other factors, higher industrial property values are associated with a higher likelihood of opting into the abatement program. Higher residential property values, however, are associated with a lower likelihood of participating in the abatement program.

This finding is consistent with the fiscal zoning hypothesis, which suggests that higher income communities may neither require nor desire industrial facilities to locate in their jurisdictions. Higher residential property values, as opposed to industrial value, are more closely associated with residential income and household wealth. It is unclear why

the total taxable value and residential property effects would be present in later study periods, but not the early study period. These findings, overall, are consistent with Dalehite's finding that industrial and commercial property values (as opposed to residential) are associated with a higher likelihood of abatement.

An alternative explanation to the fiscal zoning hypothesis is that places with historic specializations in manufacturing or industrial activity are striving to maintain their competitive advantage in those sectors through the abatement program. There may be a path dependence effect at play, influencing existing industrial areas to more aggressively pursue industrial development incentives. However, I would also question whether true path-dependent economic effects would manifest through increased abatement participation. Path dependence would suggest that a jurisdiction's economic history dictates its economic future, and that certain outcomes and patterns of development are "locked-in." Jurisdictions' participation in the abatement program itself seems to indicate that there is at least a *perception* that an industrial history is insufficient to guarantee future competitiveness in that arena. Additional research and an economic history of districts participating in abatement agreements would be required to understand whether path dependence is a viable explanation. For further information on the theory of path dependence and economic development see Paul David's 2000 work, "Path dependence, its critics, and the quest for 'historical economics.'"

Additional predictors of note are observable in the early study period from 2003 – 2007. Urban district and Chapter 41 status are statistically significant and have a meaningful effect on the odds of entering into an abatement agreement. During the early period, the odds of an urban district adopting an abatement are 2.6 times higher than the odds for a non-urban district, holding other covariates constant. This aligns with Dalehite's finding that abatements are more likely to be an urban phenomenon, especially early in the

program's lifespan. As with Dalehite's probit regression estimations, the effect of a district's urban status on abatement participation is not statistically significant in later study periods.

For the early study period, Chapter 41 status is statistically significant at below the .05 level and is associated with a sizable odds ratio. Holding other covariates constant, the odds of a Chapter 41 school participating in the abatement program are 4.5 times higher than the odds for a non-Chapter 41 school. This is consistent with my hypothesis that school districts subject to revenue recapture from the state are more likely to grant abatements to firms – since this allows them to shelter local revenue from state recapture and they do not experience a reduction in state school aid. This finding is as anticipated and consistent with the hypothesis that property-rich districts with donor status to the school finance system will be more likely to offer abatements.

However, this factor is only statistically significant in the program's early period. The full and late study periods do not feature Chapter 41 status as a statistically significant predictive variable. It is possible that property-wealthy Chapter 41 schools were early adopters of the program because they have a strong incentive to keep their tax revenues in their local district. It is also possible that a policy change, or simply expanded knowledge of the program over time, contributed to a proliferation of abatements among non-Chapter 41 districts in later years. It appears that both industrial wealth and a district's position in the school finance system incentivize abatement participation in Texas for early abaters.

For the 2008-2014 late study period, the only remaining statistically significant predictor with a meaningful coefficient size is the number of Chapter 312 agreements in the district's overlapping jurisdictions (city and county). A district located in an area with an additional Chapter 312 agreement has odds of adopting an abatement 1.12 times higher than a district lacking that additional 312 agreement. While the odds ratio is not as large as

for the dummies of Chapter 41 or urban status in prior study periods, this is to be expected given the variable's unit size. *One* additional agreement produces a 12% increase in the odds of hosting an abatement. Many jurisdictions host multiple Chapter 312 agreements. In 2002, for example, the Harris County area was home to 24 Chapter 312 agreements (granted either by the county or cities within the county). Chapter 312 agreements are not an influential predictor in earlier periods, and neither Chapter 41 nor urban status are predictive during the late bird time period.

Notably, the tax rate is not statistically significant in any period. This would seem to indicate that either the fiscal health or stress hypotheses are not applicable, or that tax rate is not an adequate indicator of stress or health in this context. The differential between the effects of industrial and residential property may provide some evidence for the fiscal stress hypothesis since increased residential property is associated with a lower probability of abatement, indicating that wealthier communities with similar levels of industrial property are less likely to grant abatements. It appears that some communities may be relying on industrial firm attraction as an economic base, but as residential property values increase there is less desire or need to attract those firms. Future research should also explore whether path dependent effects are at play, and whether historically industrial economies more aggressively pursue industrial property tax abatements. Again, see David (2000) for a discussion of path dependent economic development.

The results of this logistic regression analysis, therefore, replicate several of Dalehite's findings in Texas. The selection model does not decidedly confirm that a district's level of fiscal burden (measured through tax rate, controlled for through property tax values) predicts its participation in the abatement program in Texas. Industrial property tax values, however, *are* predictive of abatement status. This suggests that there is a

relationship between fiscal conditions in the community and the decision to offer abatements.

Chapter 41 status, moreover, is strongly predictive in the early period. While this result does not hold into later periods, it may still be meaningful in discussions about the effects of the program on school finance. Some of the abatement agreements adopted during the early study period are still in place, and the state may still be feeling the effects of these abatement on its school finance system.

Urban status loses its predictive power in later periods, as well. Again, this is perhaps due to the proliferation of the policy among late adopting districts due to their limited knowledge or capacity. It may also be reflective of a policy change during the program's operation. Lastly, the introduction of Chapter 312 agreements as a predictor yields interesting results. The proliferation of both Chapter 313 and 312 agreements appears to be occurring throughout the lifespan of Chapter 313. This may provide evidence for the copycat or positive feedback loop hypotheses that areas granting abatements tend to grant even more abatements over time. Moreover, if a city or county offers a 312 abatement that affects a neighboring school district in a multi-district county, then a district might feel pressure to compete intra-regionally by offering its own incentives. More research would be required to understand the interaction between Chapter 312 and 313 agreements fully.

PROPENSITY SCORE MATCHING AND OUTCOME MODEL RESULTS

After estimating the selection model, I use a propensity score matching study design to estimate the effects of abatement participation on a district's industrial property tax base. This approach is inspired by, though not identical to, Dalehite's two-step Heckman correction design. I use results from the logistic regression to identify school district pairs

that have similar probabilities of participating in the abatement program and are therefore balanced with regard to the selection covariates. This design has the benefit of enhancing comparability across "treatment" and "control" districts on observable covariates, despite their self-selection into the program.

This section describes the results from the propensity score matching process, demonstrating the comparability of matched pairs on the selected covariates. I then present outcome model estimates for the three study periods (early, full, and late). In addition to the explanatory abatement variable, I control for covariates identified by Dalehite in 2005 as potentially contributing to increases in the industrial tax base over time.

Model Accuracy and Covariate Balance in Matched Pairs

This section discusses the accuracy and overlapping of the selection model's estimated abatement probabilities, since I use those probabilities to produce matched pairs and control for self-selection bias in the outcome model. I also discuss the balance of covariates in the matched pairs that are constructed from the predicted probabilities as a way to ensure comparability between abating and non-abating districts.

As discussed previously, the selection model has somewhat low predictive power. The pseudo R-squared statistic is low for all study periods, suggesting that the model as a whole does not predict a large percentage of the variation in districts' decision to adopt a tax abatement. Figures 1, 2, and 3 show the frequency of estimated abatement probabilities for the early, late, and full study periods by observed abatement status. In all three study periods, most districts have an estimated abatement probability of less than 0.50. This is true of *both* the observed non-abating and abating districts.

In the full study population, only a minority of districts maintain active abatement agreements. In the early period, only 25 (2.5%) of 999 school districts offered an abatement

between 2003 and 2007. In the total and late adopter categories, these numbers rise to 128 (13%) and 115 (12%), respectively. The selection model, therefore, *correctly* predicts that most districts won't participate in the abatement program. However, the model underestimates the probably of abatement participation, as can be seen by the lack of predicted probabilities over 0.50 in the observed abatement group.

In order to be useful in the propensity matching context, the selection model needs to discriminate somewhat between abaters and nonabaters but also have sufficient overlap in probabilities to produce comparably matched pairs. As demonstrated by the box plots in Figures 1-3, the model discriminates more effectively between abaters and nonabaters during the later study periods, but still underestimates the probability of abatement. The selection model as a whole does not discriminate extraordinarily well between abaters and nonabaters. The model does, however, provide sufficient overlap in predicted probability scores to provide effectively matched pairs of abating and nonabating districts, as evidenced by the grey overlapping box plot areas.

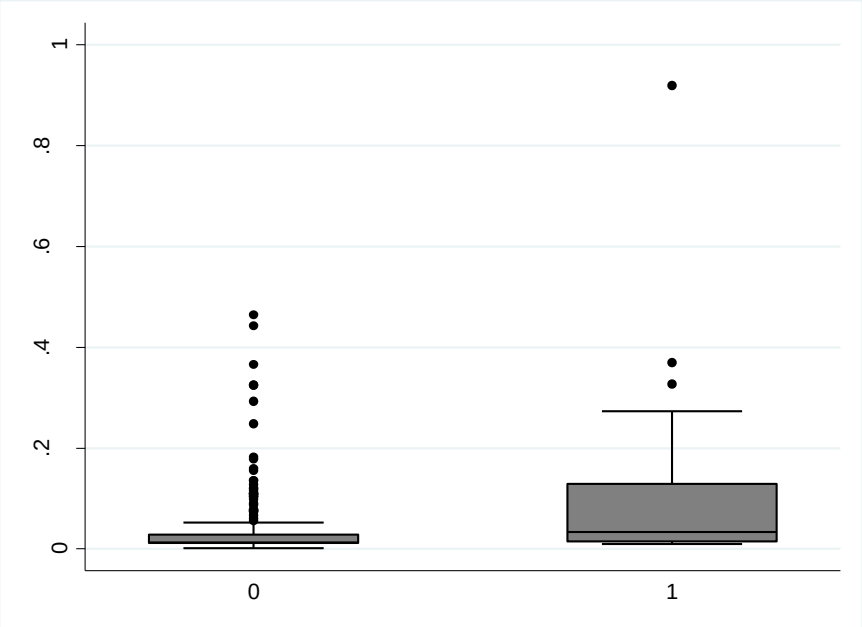

Figure 1: Frequency of Abatement Probabilities for Early Study Period (2003-2007)
Note: Zero and 1 on the horizontal axis refer to observed abatement status (i.e. 0=did not grant an abatement between 2003-2007, 1=granted an abatement between 2003-2007).

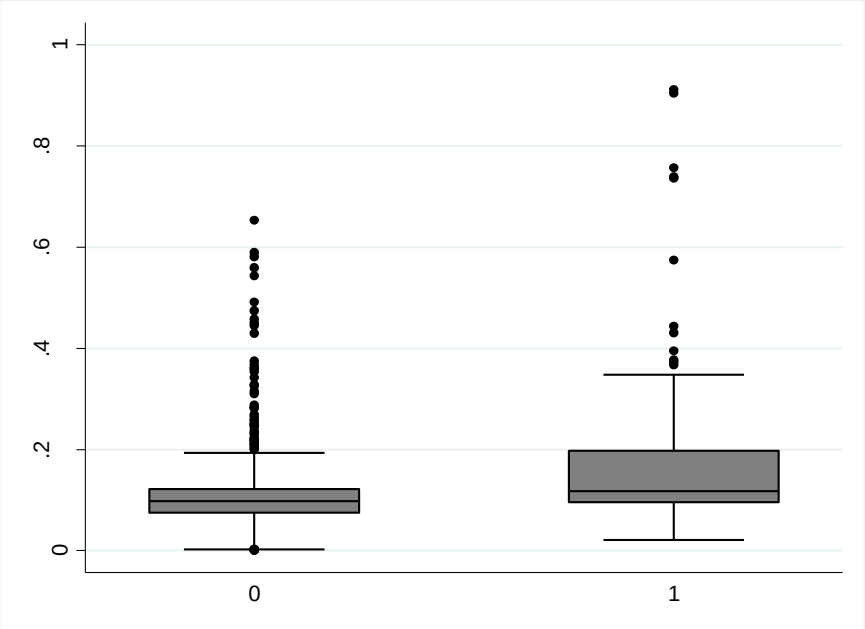

Figure 2: Frequency of Abatement Probabilities for Late Study Period (2008-2014)
Note: Zero and 1 on the horizontal axis refer to observed abatement status (i.e. 0=did not grant an abatement between 2008-2014, 1=granted an abatement between 2008-2014).

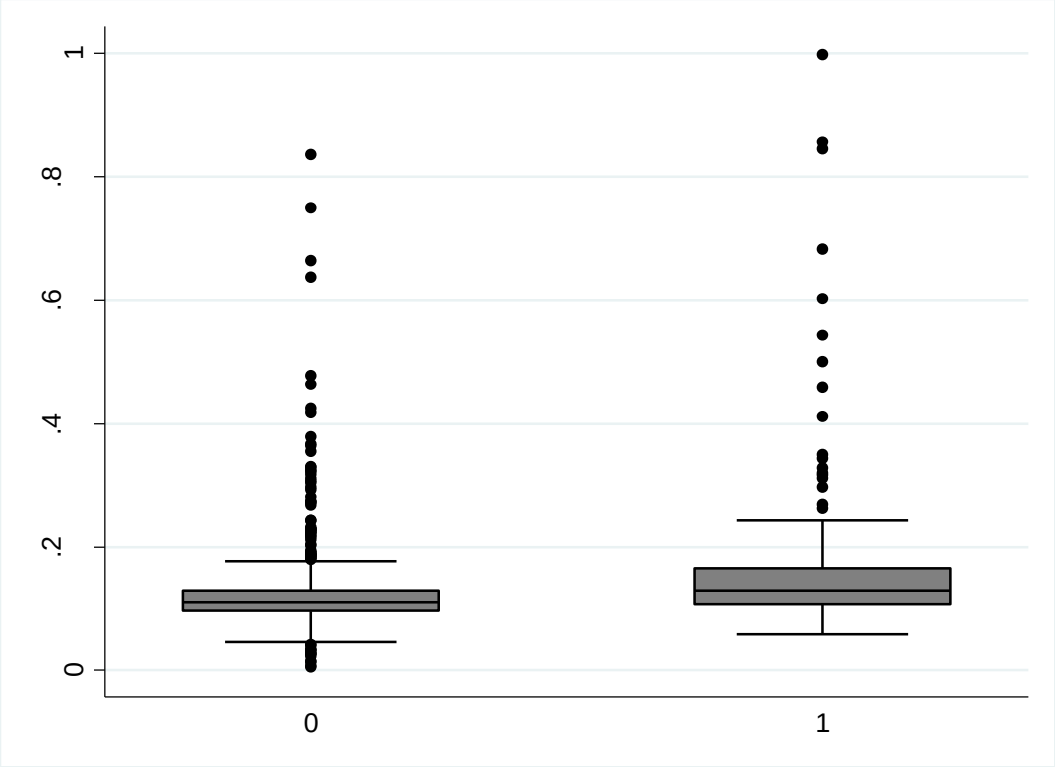

Figure 3: Frequency of Abatement Probabilities for Full Study Period (2003-2014)
Note: Zero and 1 on the horizontal axis refer to observed abatement status (i.e. 0=did not grant an abatement between 2003-2014, 1=granted an abatement between 2003-2014).

I use the probability of abatement, generated from the logistic selection model, to match abating districts with nonabating districts based on their shared level of abatement probability. If the matching process is successful, I expect to see improved balance on the covariates within the matched study population. These improvements are observable in Tables 13 and 14. In Table 13, which displays selection covariate statistics from the full unmatched study population, large discrepancies are observable between abaters and nonabaters. These differences would make it difficult to compare the abatement with the nonabatement group, since differences in the outcome variable (i.e. industrial property

growth) could be attributable to any of these self-selection factors. In particular, the unmatched study population has large observable differences in taxable and assessed property variables, as well as urban status, Chapter 41 status, and other variables.

By comparison, the matched study samples (see Table 14) are more balanced on these covariates. With the exception of Chapter 312 status, the districts appear to be better matched on virtually all covariates than they were prior to matching. The matching process does not eliminate differences between the two groups, but takes important steps toward controlling for severe differences in, for example, Chapter 41 status, urban status, and taxable value. It is unclear why the Chapter 312 variable appears more poorly balanced in unmatched than the matched population.

	2002 - 2007		**2002 - 2014**		**2008 - 2014**	
abatement status	0	1	0	1	0	1
n	974	25	871	128	884	115
tax rate	1.54	1.56	1.54	1.53	1.19	1.17
tot tax value/pup	2.72	4.83	2.56	4.21	4.17	8.24
assess ind/pup	0.32	2.43	0.28	1.01	0.44	1.27
assess resid/pup	0.87	1.05	0.90	0.68	1.35	0.84
urban status	0.25	0.48	0.26	0.25	0.28	0.23
% edu dis	48.06	41.28	47.64	49.63	52.74	54.58
Δ fed fund	-201.19	-180.46	-199.38	-209.46	877.95	969.65
total chapter 312	0.50	1.64	0.52	0.61	0.58	0.80
chapter 41 status	0.08	0.36	0.07	0.18	0.13	0.26
probability	0.02	0.12	0.12	0.18	0.11	0.18

Table 13: Covariate Balance, Unmatched Abaters and Nonabaters, by Study Period

	2002 - 2007		2002 - 2014		2008 - 2014	
abatement status	0	1	0	1	0	1
	25 pairs		*128 pairs*		*91 pairs*	
tax rate	1.53	1.56	1.54	1.53	1.16	1.17
tot tax value/pup	4.79	4.83	4.04	4.21	6.82	8.24
assess ind/pup	2.08	2.43	0.75	1.01	1.16	1.27
assess resid/pup	0.72	1.05	0.69	0.68	0.81	0.84
urban status	0.40	0.48	0.27	0.25	0.24	0.23
% edu dis	46.28	41.28	50.25	49.63	54.91	54.58
Δ fed fund	-184.84	-180.46	-218.56	-209.46	1079.26	969.65
total chapter 312	1.40	1.64	1.05	0.61	1.00	0.80
chapter 41 status	0.44	0.36	0.16	0.18	0.26	0.26
probability	0.10	0.12	0.17	0.18	0.17	0.18

Table 14: Covariate Balance, Matched Abaters and Nonabaters

The matching process was reasonably successful, and can be expected to control for most of the observed covariates. Importantly, however, propensity matching has its limitations. As discussed in Chapter 4, this process does not control for unobserved covariates. It is possible that other unaccounted for variables influence the outcome. I control for some additional outcome covariates identified by Dalehite in 2005 in the final outcome model.

Additionally, the propensity score matching design works by eliminating unmatched nonabaters from the study population. Limiting the control group to comparable districts allows for a quasi-experimental evaluation of the program. However, a large population of nonabating districts are by design then excluded from the evaluation. These reduced sample sizes may be more prone to delivering results with high levels of statistical insignificance.

Outcome Model Results

For the selection model, I produced three regression models (one for each period). However, for the outcome model, I estimate *four* outcome models. This is a departure from Dalehite (who only estimates three outcome models). I elect to estimate the effects of early abatement adoption both for the early study period *and* over the course of the *full* study period.

Therefore, for early adopters, I present findings for both the 2003-2007 period and 2003-2014 period. I believe this additional model will help elucidate whether there are effects from early abatement participation that are only observable over a longer span of time. It is possible, for example, that the effects of abatement adoption do not take full effect on property assessment until 5-10 years following adoption of the agreement. I then present findings for the late group from 2008-2014, and the total abatement group from 2003-214.

Collinearity

As with the selection model, I perform a test for collinearity among independent outcome variables. I examine the VIF for each variable in each study period. See the results in Table 15 below. The first early study period model (2003-2007) has very low VIFs, indicating very mild but ultimately unconcerning levels of collinearity. The remainder of the models, however, all indicate severe collinearity with the tax rate variable. In fact, I was unable to run a VIF test including tax rate without an error for these latter study periods. Due to this challenge, I omitted the tax rate variable from the VIF test. The tax variable is also omitted in the outcome model estimations that follow.

After omitting the tax rate variable, the VIF for remaining variables in later study periods all fall below 2, indicating acceptably mild levels of collinearity. After removing

tax rate, I do not anticipate collinearity to bias the coefficients or levels of significance for the outcome estimates.

Variable	VIF (03-07 eb1)	VIF (03-14 eb2)	VIF (03-14 tot)	VIF (08-14)
earlybird abate.	1.07	1.04	-	-
latebird abate.	-	-	-	1.01
all abate.	-	-	1.02	-
Δ tax rate	1.11	*Collin. Error*	*Collin. Error*	*Collin. Error*
Δ exp. per pupil	1.24	1.12	1.02	1
Δ educ. attain.	1.16	1.18	1.02	1.01
Δ poverty	1.03	1.2	1.02	1.02
Δ pop share	1.12	1.13	1.03	1.01
constant	1.11	1.12	1.02	1
Mean VIF	1.12	1.09	1.02	1.01

Table 15: Collinearity Test for Outcome Variables

Predictive Power

Table 16 presents outcome results for the OLS regression model for the four regression periods identified above (including two models for early adopters). The predictive power of the model is low or statistically insignificant in each period. The two early adopter regressions have R-squareds that are not statistically significant, suggesting that the model's predictions may not be reliably interpreted. The first early adopter regression for 2003-2007, in particular, has a very high level of statistical insignificance. The low levels of statistical significance may, in part, be attributable to the reduced sample population for this group. These early adoption group has a sample population of only 50.

The full and late adoption periods have statistically significant but low R-squareds of .03 and .07, respectively. This indicates that the models explain only 3% and 7% of variation in changes in assessed industrial property value over the respective study periods. Omitted variable bias remains a weakness of this, and any, statistical regression model.

Please see Chapter 4 for a discussion of model limitations. However, the propensity matching design controls for at least some variation due to program self-selection, including urban status. Urban status may act as a reasonable proxy for other omitted, but potentially influential, variables such as infrastructure Despite the low predictive power of the overall models, we can still look at individual covariates for more information about factors that influence growth in assessed industrial property value.

Δ indust. assessment	**2003 – 2007 (earlyabate1)**		**2003 – 2014 (earlyabate2)**		**2003 – 2014 (all)**		**2008 – 2014 (late)**		
	Coef	Sig	Coef	Sig	Coef	Sig	Coef	Sig	
earlybird abate.	720.63	0.58	-5110.82	0.16	-	-	-	-	
latebird abate.	-	-	-	-	-	-	1141.68	0.14	
all abate.	-	-	-	-	-501.39	0.65	-	-	
Δ tax rate	-266.06	0.74	*Omitted Collin.*		*Omitted Collin.*		*Omitted Collin.*		
Δ exp. per pupil	0.03	0.95	0.10	0.77	-0.14	0.22	-0.06	0.44	
Δ educ. attain.	19.85	0.91	-97.17	0.82	75.59	0.55	61.25	0.57	
Δ poverty	-253.38	0.53	474.74	0.33	-66.36	0.59	89.52	0.34	
Δ pop share	-143.91	0.61	45.43	0.38	97.32	0.00*	-90.04	0.00	*
constant	173.43	0.96	-1714.81	0.66	-298.69	0.80	188.13	0.77	
N	50		50		256		230		
Pairs	25		25		128		115		
R-squared	0.11		.01		.03*		.07*		
Prob > F	0.97		.52		.04		.02		

*statistically significant at below the 0.10 level

Table 16: Outcome Model Results

Note: Δ industrial assess. Expressed in hundreds of thousands of dollars, Δ tax rate expressed in tenths of a percent, dollar values adjusted for inflation within study periods (e.g. early study period expressed in 2007 dollars etc.)

Explanatory Variables and Individual Predictors

The explanatory variable (i.e. abatement participation) bears no statistically significant predictive power across any of the four study periods. The coefficients for the 2003-2007 early study period and full 2003-2014 period (with all abaters) are particularly

insignificant with p-values of over 0.50. The results for the early adopter sample from 2003-2014 and the later study period from 2008-2014 are *more* significant (with p-values between 0.10 and 0.20), but they do not comply with standard conventions for levels of significance. They are not strong enough to justify inferences about the program.

Moreover, the direction of the coefficients in each of these more significant periods contradict each other (with the early adopter 2003-2014 results suggesting a negative directional relationship and the late study period a positive relationship). While it is tempting to interpret these coefficients and posit hypotheses about the causes of these contradictions, I do not believe this would be a productive exercise. We cannot, with reasonable probability, infer that these coefficients are statistically different from zero.

These regression results, therefore, suggest that participating in Chapter 313 bears no statistically discernable relationship to growth in a district's industrial property tax base. There is no statistically significant evidence from this regression that granting an abatement has helped to expand the industrial property tax base of a community and, by extension, driven firms to locate in a jurisdiction. When controlling for other factors that plausibly affect firm siting and program self-selection, the decision to grant abatements appears to have no statistically discernable relationship to growth in the industrial property tax base. The implication is that a firm's decision to make industrial property investments in a community are just as likely to occur without a tax abatement as with one. Or, at least, our model provides us with no evidence to refute that possibility.

Among the outcome covariates, only one statistically significant relationship is observable in the model estimates. In both the full and late adopter study periods from 2003-2014 (with all abaters) and 2008-2014 (with late abaters), respectively, the change in a jurisdiction's share of the state population is highly statistically significant when predicting changes in the industrial property tax base. However, the directions of the

coefficients contradict one another. For the later period, the coefficient of -90.04, (expressed in hundreds of thousands of dollars), is negative while in the full period it is positive at 97.32. Therefore, during 2008-2014, each additional hundredths of a percentage point increase in the jurisdiction's share of state population is associated with $9,004,000 decrease in the industrial property tax values, when accounting for all other variables. In the full study period, however, a hundredths of a percentage point increase in the state population is associated with a $9,732,000 *increase* in the assessed industrial property value.

It is unclear why this discrepancy would be observable between the two study periods. A decrease in the assessed value of industrial property could occur for a number of reasons. For example, the fiscal zoning hypothesis might suggest that, as districts' populations grow and the area demonstrates its desirability to incoming residents, communities will be less likely to recruit industrial firms and may choose to zone industrial uses *out* of the city to cater to an incoming residential population. Industrial companies may also decide voluntarily to relocate if the area becomes congested or difficult to conduct industrial activities within due to population increases.

A growing share of the state population could also cause *increases* in industrial property values if population centers provide amenities and assets for industrial firms. It is possible that, as certain locales become population growth centers, this creates a local labor supply and additional amenities that are attractive for firms. It is unclear why the direction of the coefficient would switch between the two periods. More research may elucidate reasons for this discrepancy. For example, future research may choose to analyze shifts in program or industry participation over time. For example, perhaps the employment-lite but property-intensive development of wind farms in rural Texas may explain the negative association between industrial property values and population growth during the latter half

of the study period. The driver may be due to shifts in the mix of industrial firms across regions.

Regardless of underlying explanations, it is clear from the estimates that share of population growth is a more confident predictor of changes in industrial property values (and, by implication, firm siting) than abatement status. Holding population growth and other factors constant, abatements don't appear to be influential in the growth or shrinking of the industrial base. While industrial property wealth prior to the study period appears to predict abatement *participation*, abatement participation does not predict growth in property wealth over time.

None of the other covariates are statistically significant. Changes in educational attainment or spending per pupil are statistically insignificant. Poverty rates are insignificant, as are tax rates for the early period. As indicated previously, tax rates have been omitted from later models due to issues with collinearity.

The findings from the outcome model differ from Dalehite's findings. Dalehite finds that abatement participation has a statistically significant effect on changes to assessed personal property values over time. He finds that abatement participation is associated with growth in personal property assessments, which he uses as a proxy for industrial investment. Dalehite thus concludes that participating in abatements, at the district-level, has some effect on firm-siting and only further exacerbates property wealth disparities between districts. Data in Texas, however, are available on industrial property assessments, both real and personal. Findings from this study show an absence of evidence indicating that abatement participation produces industrial firm investment. While wealthier districts are more likely to participate in Texas, and receive some benefits from participation in the form of sheltering local revenues from the state finance system, there is no indication that participation further enhances the industrial property tax base of the

district. Differences in data, as well as study design, may be responsible for these disparate findings.

Chapter 6: Discussion

The previous chapters provided background on the school property tax abatement program in Texas and reviewed findings from a quantitative analysis of program participation and its effect on industrial property investment. This chapter will synthesize the findings from previous chapters with results from the qualitative survey data in order to delineate overarching findings for the program.

FINDING 1

Industrial Property Wealth Predicts Chapter 313 Participation

Districts with higher pre-existing industrial property values are more likely to grant an abatement, controlling for a variety of fiscal and population factors. This is true for both early and later study periods, as well as over the program's full lifespan from 2003-2014. Logistic regression results show that each additional $100,000 in previously assessed industrial property value is associated with a 29% increase in the odds of granting an abatement over the lifespan of the program. This result replicates Dalehite's finding in Indiana. This relationship exists controlling for a number of potentially influential factors such as tax rate, residential property values, urban status, and percentage of educationally disadvantaged students, for example (see Chapter 4 for a description of all variables that the selection model controls for).

Dalehite posits that, in Indiana, jurisdictions may be engaging in a proactive effort to form "agglomeration" economies through the abatement program. That is, jurisdictions use abatements in an attempt to attract firms from a specific industry, in order to capture the positive spillover effects from firm colocation. While this theory may apply when cities grant abatements, as is the case in Indiana, I am skeptical of whether school districts engage in this level of economic development planning. Cities often maintain economic

development offices dedicated to examining import substitution or cluster strategies. School district boards, however, typically attend to educational operations and school finance and do not necessarily have economic development offices that engage in this level of economic planning.

This finding may, alternatively, provide some evidence for the fiscal zoning hypothesis, when considered in conjunction with residential property values. The regression results show that, over the course of the full study period (but especially in the later study period from 2008-2014), higher assessed residential property values are associated with a *lower* likelihood of granting an abatement. The implication is that districts with wealthy *residents* choose not to offer industrial abatements, potentially due to these facilities being "LULUs," or locally unwanted land uses. As residential property values increase, the likelihood of abatement declines. When industrial property values increase, the likelihood of abatement increases, suggesting that some communities may use industrial firm incentives as a way to buoy an otherwise insufficient residential tax base. Residents are willing to trade fiscal benefits for environmental quality as residential property values rise. More research may wish to explore the fiscal zoning hypothesis and its application to Texas' Chapter 313 program.

Alternatively, this phenomenon could stem from historic economic development trends in these school districts. It is possible that regions with high levels of historic industrial development are more likely to grant abatements in order to maintain their historic competitive advantage in this sector. More research would be necessary to understand whether historic development patterns explain abatement participation. Regardless of causal mechanism, the policy implications of this dynamic remain the same. Districts with higher industrial property values are more likely to participate in (and therefore reap any benefits from) the abatement program.

Dalehite's primary concern is whether the school abatement program confers an inequitable distribution of benefits to an already fiscally privileged class of districts. This study has attempted to understand whether this is true in Texas, as well. In Texas, districts that participate in the abatement program receive indirect subsidies for participation via the state school aid formulas, as well as supplemental PILOTs directly from the firms themselves. Wealthy districts with redistributive obligations under Chapter 41 are also able to shelter some portion of local tax revenue from state recapture via Chapter 313. The inequitable distribution of fiscal benefits to participating districts would only be further compounded if the program achieved its economic objectives of driving industrial firm siting to these jurisdictions. Dalehite, for example, finds that in Indiana, the abatement program is effective at driving investment into participating districts, which only enables wealthy districts to become wealthier.

Findings from this report do not corroborate Dalehite's latter finding, since the model shows no evidence of a relationship between abatements and growth in industrial property values (see Finding 3, below). However, the finding that industrial property values predict participation remains significant, since it means wealthy districts are receiving state subsidies through the school aid formulas as well as PILOTs directly from firms. These payments enhance a school's wealth and resources outside of the redistributive school finance system. If wealthy schools are receiving more money via PILOTs than less wealthy schools, then the program may exacerbate resource disparities.

Moreover, even if the program fails to drive firm siting to participating districts, the state still provides an indirect subsidy to districts by maintaining their state school aid at the same level as prior to the abatement, despite any growth in the property tax base that might occur from that firm siting decision. If abatements do not drive firm siting, and if firms would have located in the district *without* the abatement, then these districts would

have otherwise experienced a reduction in state funding. The state, therefore, is paying proeprty-wealthy districts more than it otherwise would via artificially inflated levels of school aid.

FINDING 2

Early in the Program, Chapter 41 and Urban Status Predict Participation

The quantitative results show that a district's prior Chapter 41 status predicts abatement participation in the early years of the program's operation (2003-2007). Being a Chapter 41 school in 2002 increases the odds of participating in an abatement between 2003 and 2007 by over 400%. This is consistent with Finding 1, since industrial wealth is associated with abatement participation and taxable property value is one component in determining Chapter 41 status. However, both of these relationships exist when holding the other variable constant. In other words, Chapter 41 status is statistically significant even when holding total taxable value and industrial property wealth constant. In other words, it's not just proeprty wealth that is predictive, but the district's classification as a donor school in the state's redistributive school finance system.

The positive relationship between Chapter 41 status and abatement participation is corroborated in a review of news coverage (see Chapter 3) as well as survey data on the program. To supplement quantitative findings, I conducted a survey of district officials in Chapter 313 districts. Five out of seven district said that they supported one or more tax abatement agreements because they anticipated losing revenue to the state's redistribution system as a function of their district's Chapter 41 status. None of the four school board presidents who answered this question said that they voted for an abatement due to Chapter 41 status, however.

Five out of seven superintendents also identified “less local tax revenue foregone to the state's redistribution program” as a benefit of the abatement program for Chapter 41 districts. Two out of four board presidents agreed that this was a benefit for Chapter 41 districts. One superintendent shared the following sentiments regarding the abatement program:

> *313s are essential for Ch. 41 districts, due to us sending OUR MONEY back to the state. It is our money that our moms and dads generate. If other districts want the wealth we have, then put leaders in place that will attract that level of business to their districts. We take a huge hit from the beginning with the way the refineries value their property, due to the mid-point evaluations they use. We will not only continue to enter into 313s, but I will aggressively negotiate the agreements to acquire money above and beyond what is 'in ' the agreement. My main job as a 41 supt is to keep as much of OUR MONEY as possible and look for other revenue generating opportunities as we go. Big business is good for these communities and our moms and dads and our district. I will continue to lead the way in this area.*

This superintendent says that he or she will seek out “money above and beyond what is ‘in’ the agreement,” in likely reference to PILOTs. Thus, there is evidence to suggest that the program’s design, and in particular the supplemental payment provision, makes Chapter 313 especially attractive to Chapter 41 schools. Chapter 41 districts must return revenues above an excess per capita threshold to the state. Some Chapter 41 district officials consider PILOTs a tool to keep revenues in their district. Sentiments from this survey respondent are similar to those shared by the La Porte ISD superintendent quoted in Chapter 3. The qualitative data illustrate a perception among some administrators that PILOTs and the Chapter 313 program allow Chapter 41 districts to “keep” their own local money in their district.

The quantitative data support this narrative, and show that Chapter 41 status is predictive of participation, but only early in the program. However, the effect is large. It is

unclear why the effect would only be present early in the program. It is possible that a programmatic change over the course of the full study period produced either a decline in Chapter 41 district participation, or an increase in non-Chapter 41 districts. In 2007, for example, the Legislature expanded Chapter 313 eligibility to include nuclear, internal gasification, and ultra-clean energy projects. Perhaps this created an opportunity for more diverse districts to participate. In 2009, the Legislature limited PILOTs to $100 per student per year. Perhaps this limitation on PILOTs muted the incentive for Chapter 41 schools, reducing their participation. More research is required to better understand the period effects.

These quantitative findings, combined with the survey data, point to a contradiction between the state's wealth equalization objectives in the school finance system and its economic development policy. This, combined with Finding 1 on industrial property wealth, points to the need for further research on how Chapter 313 affects equity in the school finance system. Further research should be conducted to better understand how these two policies interact and whether the program is undermining educational objectives.

Urban status is also related to program participation early in the program's lifespan (2003-2007). Urban status is not related to participation in later years. Once again, this shift could be due to expanded program eligibility during the study period. In particular, ultra-clean energy projects were added to the list of eligible sectors in 2007, opening up the program to participation from wind energy projects, most of which require large swaths of land and are located in rural West Texas. This is one potential explanation, though further research would be required to confirm this hypothesis.

The finding on urban status is similar to Dalehite's. Dalehite finds that population density is associated with abatement participation early on, but less so in later years. He attributes this, in part, to the flight of industrial manufacturing from the cities to the suburbs

and outskirts of urban areas. Another possible explanation is the natural proliferation of abatements over time. The copycat hypothesis would propose that districts, over time, increasingly adopt abatements in order to compete with neighboring districts.

FINDING 3

Abatement Participation Does Not Predict Industrial Investment

The ultimate aim of this study has been to understand whether granting tax abatements is associated with an increase in the industrial property tax base, and what the implications are for school finance. The industrial tax base acts as a proxy for industrial firm siting and provides valuable information about whether the program is producing the desired economic benefit for school districts.

The quantitative findings from this report show no statistically significant effect on firm siting, holding a host of other variables equal across districts. The quantitative findings do not (nor can they) conclusively prove the absence of a relationship. The oft-cited maxim holds true that absence of evidence is not evidence of absence. However, given the observable program data and study design, I do not locate evidence of a relationship between abatement participation and growth in industrial proeprty values. The regression results have a very low levels of statistical significance. We cannot reject the possibility that abatements have zero effect on industrial property values over time.

Significant policy implication can be drawn from this finding. Districts are effectively "spending" state school finance dollars by granting abatements to firms. These abatements, however, appear to have no discernable effect on a firm's decision to locate within that district. This study finds no evidence that abatements have an effect on industrial property growth, which means that districts are potentially omitting millions of dollars of industrial property from their tax rolls unnecessarily. Importantly, the state

school finance system internalizes full cost for this program by continuing to pay the same level of state aid to participating districts. Districts are not forced to pay for the costs of these unnecessary abatements.

As emphasized before, no study can conclusively rule out the possibility of a relationship between abatements and industrial investment. However, with the tools available today for evidence-based policymaking, it is worth inquiring whether the state should spend billions of dollars on a program for which no empirical evidence exists demonstrating its efficacy. Although districts offering abatements may point anecdotally to rising industrial property values and new firm sitings in their districts, results from this study show that any apparent gains may not be attributable to the tax abatements, but rather to changes in population share or other unobserved variables. While some literature suggests that abatements may be effective intra-regionally, this study shows that even at the district level there is no evidence of a relationship.

Neither the selection nor outcome model in this study take PILOTs into account. Districts often receive PILOTs as a condition for granting an abatement. Therefore, even if the abatement produces no growth in the property tax base, districts remain incentivized to grant abatements. The state, however, still loses out because that money is not accounted for in the school finance system or in Chapter 41 recapture calculations.

While this study finds no evidence of a relationship between industrial investment and abatements, some school district board members and administrators maintain a strong belief that abatements drive investment. Five out of seven superintendents who answered this survey question said that they supported one or more abatement agreements in order to increase the property tax base of the district. Six out of seven, moreover, identified "increased revenues from an expanded tax base" as a benefit of the abatement program for their district. Four out of four board presidents said they entered into the abatement in order

to increase the property tax base, while four out of four cited this as a benefit for their district.

In conclusion, there is insufficient evidence to claim that abatements produce the desired industrial investment at the district level. As discussed in Chapter 4, this finding is subject to some potential biases which bear repeating in this section. First, this analysis does not consider abatements that school districts may have entered into prior to 2002. It is possible that some districts had existing abatement agreements from Chapter 312. It is also possible for any existing agreements to affect program participation or industrial property investment. Further research should be done to eliminate pre-2002 abatements as a causal variable in industrial property value growth.

As a final caveat, low levels of statistical significance may be attributable to a misspecified model. There could be nonlinear relationships at play that make some variables appear less important than they actually. Modeling additional interactive terms would be necessary to determine whether nonlinearity could be a source of error in the outcome model.

In conclusion, however, findings one through three suggest that the state should consider the distributional consequences of Chapter 313 program participation and its implications for wealth equalization in the school finance system. The state may wish to reevaluate components of the program, such as PILOTs, that incentivize Chapter 41 districts to participate, or conduct a more intensive distributional analysis of the benefits and burdens of property tax abatements. Additionally, the state may wish to perform additional program evaluations to determine whether the program is actually causing firms to invest in districts where they would not otherwise go. This study finds no evidence that the program affects industrial property investment. This is a concern given that the state is

currently paying over $90,000 per job "created" under the Chapter 313 program – jobs that might have been created and come to the district regardless of the incentive.

FINDING 4: MORE QUALITATIVE AND QUANTITATIVE RESEARCH IS NEEDED

A literature review on school property tax abatements revealed little to no research on this class of abatements. Moreover, it appears that – apart from this and Dalehite's study – there have been few attempts at a quantitatively rigorous economic evaluation of the program. If the state of Texas wishes to adopt positive program reforms, it may be beneficial to understand more about how the program is working, which would include quantitative evaluation and qualitative studies on districts' experience with the program. As discussed in Chapter 3, one of the difficulties in reforming the program is the high level of support that the program garners from districts. Understanding the perceptions that undergird their support will be helpful when proposing pragmatic reforms.

In findings one through three, I present some limited data from my survey of school district officials. I present data where it corroborated quantitative findings, and thus where I felt it could contribute to a larger narrative. Given the low response rate for the survey, I do not wish to make inferences from survey responses alone. However, district officials did share valuable insights, and in this section I will highlight some trends in the survey data that may inform future research. The following highlights from my survey research should be further explored, both quantitatively and qualitatively. The following responses come from officials in districts that participate in the Chapter 313 program.

Survey Theme 1: District Officials Are Familiar with Chapter 313

All ten superintendents and all five school board presidents said that they had heard of Chapter 313 before the survey. Fourteen district officials said they were familiar or very familiar with the program. Only one official said they were somewhat unfamiliar with

Chapter 313. Officials in participating districts appear to be aware of the program and demonstrate some substantive knowledge about its operation.

Survey Theme 2: District Officials Are in Favor of Chapter 313

Four out of four school board presidents and seven out of seven superintendents voted to approve (or otherwise supported) all abatement agreements considered during their time representing the district. No district official reported voting against, or otherwise not supporting, an abatement. The majority of participants said that the program brought net benefits to their district.

Survey Theme 3: Beliefs about Property Tax Growth, PILOTs, Chapter 41 Status, and Jobs Creation Influence Participation

District officials frequently cited the following as motivating factors to adopt an abatement agreement: property tax base expansion, PILOTs, Chapter 41 status, and job creation.

Survey Theme 4: Chapter 313 Funds District Capital Investment

Several superintendents shared that their district would not be able to afford certain capital or infrastructure improvements without the program. The following are quotes from those survey participants:

> *Increased values allow flexibility to pass a bond to revitalize district infrastructure and make capital improvements.*
>
> *Made the possibility of revitalizing infrastructure and making capital improvements.*
>
> *As a district, our primary interest in the agreements was to increase our taxable values enough to make remodeling our school (or constructing a new campus) a realistic possibility for our taxpayers. Without the added values, our district would NEVER be able to afford the costs of a remodel or new campus -- and all of our campus buildings predate 1968 - most predate 1955.*

Survey Theme 4: Chapter 313 is Complex and Districts Require Administrative Assistance to Participate

Several survey participants shared that the program is difficult to understand and administer. One participant shared their experience of requiring consulting assistance to understand the program:

> *While we are a small, rural, property-poor school district lacking the infrastructure to analyze and effectuate this type of governmental binding agreement, we experienced no shortage of supports existing from legal counsel (Walsh Gallegos) and financial consultant (Moak Casey) existing to ensure all the proper consideration and steps are set in place. Without these instrumental members of this agreement, I am certain this process could have become burdensome.*

This quote suggests that rural, property-poor schools may require more assistance to participate in the program than wealthier urban districts. This may be one explanation for patterns in program participation, especially among urban districts early in the program. Another participant shared, regarding administration:

> *The Comptroller's Office and their rules complicate the process immensely. Agreements take a long time to complete and involve an enormous legal team.*

Future research may desire to quantify the amount of local revenue that goes toward Chapter 313 administration and consulting services, including the lobbying services that some districts employ to advocate for Chapter 313 during legislative session.

These themes, demonstrated by the survey data, may serve as a launching point for future research inquiries. Due to the small sample size, readers should not make inferences about the program as a whole only from this survey data. Additional research, both quantitative and qualitative, would add to the state's understanding of how the program may contribute to inequities in the school finance system and whether the program effectively advances the state's economic development objectives.

Chapter 7: Conclusion

This report has explored the relationship between tax abatements, property wealth, and industrial firm investment. Drawing on Dalehite's 2005 study on the Indiana school property tax abatement program, I use a quasi-experimental, propensity score matching research design to identify variables that influence school districts' participation in the Chapter 313 program in Texas and evaluate the effect of abatements on industrial property investment.

Through this methodology, I find that existing industrial property wealth predicts Chapter 313 participation. Chapter 41 and urban status strongly predict participation during the program's early years from 2003-2007. These trends represent potential sources of inequity in the school finance system, as wealthier districts are more likely to opt into the state-subsidized program. Moreover, these schools are able to accept supplemental PILOT payments directly from firms that are not accounted for in the school property tax system.

Survey responses corroborate quantitative finding that Chapter 41 districts have strong incentives to participate in the program. PILOTs, in particular, appear to create a strong incentive for Chapter 41 schools to participate. These findings suggest that the state may wish to evaluate its allowance of PILOTs, as well as its policy to exempt abated proeprty values from the state school aid formulas – a policy which grants an indirect subsidy to participating districts by allowing them to maintain their level of state school aid, despite their growing property tax base. The state may wish to consider whether the program's design contradicts the state's wealth equalization objectives.

After controlling for variables influencing selection into the program, results fail to provide evidence of a relationship between abatements and industrial property tax growth. A large percentage of survey respondents indicated that growing the property tax base was

a primary objective for granting abatements. However, this study shows no evidence that Chapter 313 produces this desired result.

This finding has important policy implications. The state currently invests billions of dollars into Chapter 313, representing a loss to the state's school finance system. This study provides no evidence that this investment is producing the desired industrial investment at the district level. The state should reconsider whether it wishes to invest billions of dollars into a program for which there is little empirical evidence demonstrating its efficacy.

Results from the analysis call into question the purported benefits of the abatement program, and suggest the potential for Chapter 313 to exacerbate inequities in the state school finance system. Despite only anecdotal evidence of efficacy, program features such as PILOTs and state reimbursement through the school aid formulas provide strong incentives for districts to continue their participation. Most respondents, in a survey of Chapter 313 districts, expressed support for the program and felt that it was conferring net benefits to their district. Property value growth, PILOTs, Chapter 41 status and jobs were frequently cited as motivators for granting an abatement. One superintendent, however, shared the following sentiment, highlighting a tension associated with Chapter 313 participation:

> *Blessed to live in a part of the state that doesn't require abatements to be attractive. More important to improve academic progress in the district as a draw for business*

The Chapter 313 program provides strong incentives for schools to participate, especially if the district lacks other amenities to attract firms. However, this superintendent highlights one crux of the dilemma for Chapter 313 schools, which is that efforts to attract business are expensive to the state public school system and arguably undermine one of

the state's greatest draws for business: a well-educated workforce. Well-informed policymaking should explore not only the purported effects of one program, but its costs and benefits relative to alternative policies or investments. Given the potentially problematic effects of Chapter 313, the state may choose to consider the costs and benefits of alternative economic development investments – one of which may be increased financial support for public education.

According to this study, there is insufficient evidence to conclude that abatements influence industrial property investment at the district level. However, this research is subject to limitations inherent in statistical program evaluation. Further research may be undertaken to explore alternative modeling approaches, or to further evaluate causal explanations for some of the trends identified in this report. This report will hopefully serve as a first step for researchers and the state of Texas to evaluate the efficacy of Chapter 313 in achieving the state's economic development objectives and its potentially deleterious effects on public school finance in Texas.

Appendix: Data Sources

CHAPTER 313 ABATEMENT DATA (2002-2014)

At the direction of the Comptroller, I created a comprehensive dataset on abatement participation by combining the agreement files available on the Comptroller's *Texas Ahead* website with two supplemental data files that I obtained from a public information request to the Texas Comptroller's Office. The supplemental data were used to create a comprehensive dataset that included all historical abatements, including those that districts adopted but have since expired. I cross-referenced the following datasets to ensure consistency, eliminate inactive agreements, and ensure comprehensiveness over the duration of the program to date. Data sources include:

Texas Comptroller of Public Accounts. (2016). *Chapter 313 Application Status 1_20_15* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts. (2016). *Application Status as of June 2014 for PIR* [data file]. Retrieved by pubic information request.

Texas Comptroller of Public Accounts. (2015). *CPA_active_agreement_list* [data file]. Texas Ahead. Retrieved from http://www.texasahead.org/tax_programs/chapter313/applicants/.

Texas Comptroller of Public Accounts. (2015). *CPA_inactive_agreement_list* [data file]. Texas Ahead. Retrieved from http://www.texasahead.org/tax_programs/chapter313/applicants/.

TAX RATE (2002-2014)

I obtained tax rate data for the study period from public information requests to both the Texas Education Agency and the Texas Office of the Comptroller. Data from the

Comptroller's office were from the office's annual Property Value Study. Data were consistent between the two sources. Data sources include:

Texas Comptroller of Public Accounts (2014). *2002 ISD Worksheet Export Detail* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts (2014). *2003 ISD Worksheet Export Detail* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts (2014). *2007 ISD Worksheet Export Detail* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts (2014). *2008 ISD Worksheet Export Detail* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts (2016). *2014 Final ISD Summary Worksheet Export Summary* [data file]. Retrieved by public information request.

Texas Education Agency. (2015). *PIR 26052_slfrpt files DATA* [data file]. Retrieved by public information request.

TOTAL TAXABLE VALUE PER PUPIL (2002 AND 2007)

I calculate total taxable value per pupil using data from both the Texas Comptroller's office and the Texas Education Agency. Total taxable value per district comes from the Comptroller's final Property Value Study findings, which are used as the foundation for state school aid calculations and are informed by self-reporting from districts. The Property Value Study provides figures for total taxable value per district. I submitted a public information request to the Comptroller's office to obtain historical data.

I then divided total taxable value per district by the average number of students in daily attendance (referred to as "Total Students" in the data description appendices), which I obtain from publicly available data on the Texas Education Agency website. For

Texas Education Agency data, please see the data definition appendices, as well. Data sources include:

Texas Comptroller of Public Accounts (2014). *2002 ISD Worksheet Export Detail* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts (2014). *2007 ISD Worksheet Export Detail* [data file]. Retrieved by public information request.

Texas Education Agency. (2012). district [2001-2002 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2012). district [2006-2007 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2002). "Appendices: Item Definitions," in *Snapshot 2002: 2001-2002*. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2002/pdf/snap027.pdf.

Texas Education Agency. (2007-2012). Snapshot 2007: Item Definitions. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2007/itemdef.html.

ASSESSED RESIDENTIAL AND INDUSTRIAL PROPERTY PER PUPIL (2002-2014)

As with total taxable value per pupil, I used data from the Comptroller's Property Value Study and publicly available information on total students per district to compute the assessed residential and industrial property per pupil. The Property Value Study contains a breakout of assessed residential and industrial property, specifically. In order to identify the appropriate variables and accompanying columns in the Property Value Study files, I referenced the Comptroller's property classification guide. See the reference below.

I only used data on assessed residential property for 2002 and 2007. However, as assessed industrial property is included in both the selection and outcome model, I used data for years 2002, 2003, 2007, 2008, and 2014. Data sources include:

Texas Comptroller of Public Accounts (2014). *2002 ISD Worksheet Export Detail* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts (2014). *2003 ISD Worksheet Export Detail* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts (2014). *2007 ISD Worksheet Export Detail* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts (2014). *2008 ISD Worksheet Export Detail* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts (2016). *2014 Final ISD Summary Worksheet Export Summary* [data file]. Retrieved by public information request.

Texas Comptroller of Public Accounts. (2014). *Texas Property Tax Assistance Property Classification Guide: Reports of Property Value.*

Texas Education Agency. (2012). district [2001-2002 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2012). district [2002-2003 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2012). district [2006-2007 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2012). district [2007-2008 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html

Texas Education Agency. (2015). district [2013-2014 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html

Texas Education Agency. (2002). "Appendices: Item Definitions," in *Snapshot 2002: 2001-2002*. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2002/pdf/snap027.pdf.

Texas Education Agency. (2007-2012). Snapshot 2003: Item Definitions. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2003/itemdef.html.

Texas Education Agency. (2007-2012). Snapshot 2007: Item Definitions. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2007/itemdef.html.

Texas Education Agency. (2007-2012). Snapshot 2008: Item Definitions. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2008/itemdef.html.

Texas Education Agency. (2007-2012). Snapshot 2014: Item Definitions. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2014/itemdef.html.

URBAN STATUS

I use the uniform classifications provided by the Texas Education Agency. I obtained historical classification data by public information request. Data sources include:

Texas Education Agency. (2016). taxvals29DEC2015 [data file]. Retrieved by public information request.

PERCENT OF STUDENTS EDUCATIONALLY DISADVANTAGED

This refers to the percentage that are eligible for free or reduced price lunch as part of the National School Lunch Program. I obtained public data from the Texas Educational Agency on the agency's website. Data sources include:

Texas Education Agency. (2012). district [2001-2002 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2012). district [2006-2007 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2002). "Appendices: Item Definitions," in *Snapshot 2002: 2001-2002*. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2002/pdf/snap027.pdf.

Texas Education Agency. (2007-2012). Snapshot 2007: Item Definitions. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2007/itemdef.html.

CHANGE IN FEDERAL FUNDING PER PUPIL (1997-2002, 2002-2007)

I calculated the dollar change in federal funding per pupil from 1997-2002 or 2002-2007, reported in inflation-adjusted dollars for the 2002 and 2007 study periods, respectively. I then divided this by the number of pupils in 2002 or 2007, respectively. I obtained data from the Texas Education Agency's public website. Data sources include:

Texas Education Agency. (2012). district [2001-2002 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2012). district [2006-2007 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2002). "Appendices: Item Definitions," in *Snapshot 2002: 2001-2002*. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2002/pdf/snap027.pdf.

Texas Education Agency. (2007-2012). Snapshot 2007: Item Definitions. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/2007/itemdef.html.

CHAPTER 312 AGREEMENTS (2002 AND 2007)

I obtained data on the number of Chapter 312 property tax abatement agreements that were active in cities and counties by public information request to the Comptroller's

Office. I matched school districts to specific cities and counties using the Texas Education Agency educational directory. If a Chapter 312 abatement is in a jurisdiction that covers multiple school districts, I assign each district within the jurisdiction a point for the abatement. Data sources include:

Texas Office of the Comptroller. (2016). *TA Log-02* [data file]. Report. Retrieved by public information request.

Texas Office of the Comptroller. (2016). *TA Log-07* [data file]. Report. Retrieved by public information request.

Texas Education Agency. (2016). *TEDDirectory_160103* [data file]. Retrieved from http://mansfield.tea.state.tx.us/tea.askted.web/Forms/Home.aspx.

CHAPTER 41 STATUS

The Texas Education Agency provides data on districts' Chapter 41 status and the recapture amount. This information is publicly available on the agency's website. Data source includes:

Texas Education Agency. (2015). TEA_1994–2016 Chapter 41 Recapture Paid by District. Retrieved at http://tea.texas.gov/Finance_and_Grants/State_Funding/Chapter_41_Wealth_Equalization/Chapter__41_Wealth_Equalization/.

CHANGE IN EXPENDITURES PER PUPIL

I calculated the change in expenditures per pupil, adjusting for inflation to the last year in each study period. Expenditure per pupil is available from the Texas Education Agency. Expenditure data are reported for the year prior to the data label. For example, the 2013-2014 dataset reports expenditure data for the 2012-2013 year. These were the

most recent data available. I used these data despite their not aligning perfectly with the beginning and end of each study period. Data sources include:

Texas Education Agency. (2012). district [2001-2002 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2012). district [2002-2003 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2012). district [2006-2007 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html.

Texas Education Agency. (2012). district [2007-2008 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html

Texas Education Agency. (2015). district [2013-2014 data file]. Retrieved from https://rptsvr1.tea.texas.gov/perfreport/snapshot/download.html

CHANGE IN EDUCATIONAL ATTAINMENT

I calculated the change in the percentage of adults over the age of 25 who have a high school degree or more. I used American Community Survey (ACS) and Decennial Census data. Due to large margins of error, the US Census Bureau now only provides district-level data as 5-year estimates, while earlier estimates are only available at the 3-year level because the census had not yet begun to produce 5-year estimates. Therefore, I elected to use Decennial Census data as the starting point for the earlier period, since it is not subject to margins of error, and compare it to the current standard of 5-year estimates. Data sources include:

U.S. Census Bureau. Decennial Census. Census 2000, using Social Explorer.

U.S. Census Bureau. American Community Survey. ACS 2009 (5-year Estimates), using Social Explorer.

U.S. Census Bureau. American Community Survey. ACS 2014 (5-year Estimates), using Social Explorer.

CHANGE IN CHILD POVERTY RATE (2003-2007, 2003-2014, 2008-2014)

I used the Small Area Income and Poverty Estimates (SAIPE) to calculate the change in the percentage of children ages 5 to 17 who are living in families below the poverty line. Data sources include:

U.S. Census Bureau. Small Area Income and Poverty Estimates. Table 1: School district estimates (2003, 2007, 2008, 2014). Retrieved from https://www.census.gov/did/www/saipe/data/schools/index.html.

CHANGE IN SHARE OF STATE POPULATION (2003-2007, 2003-2014, 2008-2014)

I used SAIPE to calculate the change in districts' share of state population over the study period. Data sources include

U.S. Census Bureau. Small Area Income and Poverty Estimates. Table 1: School district estimates (2003, 2007, 2008, 2014). Retrieved from https://www.census.gov/did/www/saipe/data/schools/index.html

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